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Corporate Financial Distress and Reorganization

An empirical analysis of pre- and post Chapter 11 leverage

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Abstract

In this thesis our objective is to expand current knowledge on determinants of Chapter 11 outcomes. We do this by investigating pre- and post-reorganization leverage from a sample of 103 large public U.S. firms filing for bankruptcy in the period 1990-2013, that emerge as public firms. Specifically, we examine leverage for firms recontracting under Chapter 11 and analyze outcomes based on how, when and where the firms reorganize.

We estimate the probability that firms emerge with leverage above their industry median, and arrive at the conclusion that firms twice as leveraged as the industry when filing for Chapter 11 are up to ∼32 times more likely to be over-leveraged when emerging. Our analysis suggests that high leverage appears to be chronic. Significant factors impacting post-bankruptcy leverage are identified and include; pre-filing capital structure, venue choice and asset liquidations. Further, we find that the amendments to the U.S. Bankruptcy Code under the Bankruptcy Abuse Prevention and Consumer Protection Act do not seem to affect the reorganization outcome for firms in our sample.

To the best of our knowledge, the results in this thesis are unique. As our review of related literature uncovers, post-reorganization leverage remains unexplored territory. In particular, we are the first to explain leverage for firms that emerge, based on how, when and where these firms reorganize.

Keywords: Bankruptcy, Chapter 11, Financial Distress, Reorganization, Leverage

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With this thesis we complete our Master of Science (M.Sc.) in Economics Business Administration at the Norwegian School of Economics (NHH). The purpose is to contribute to the ongoing discussion of insolvency in the U.S and Norway. In particular, we have written our thesis to highlight the process through which the courts handle large public cases. Additionally, we hope this thesis contributes to the UCLA-LoPucki Bankruptcy Research Database (BRD) by providing in-depth analysis of post-reorganization leverage, as well as a comprehensive data collection.

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Contents

1 Introduction **1**

2 Theoretical Aspects **4**

2.1 The U.S. Bankruptcy Code and Chapter 11 4

2.2 The Bankruptcy Abuse Prevention and Consumer Protection Act . . . 6

2.3 Venue Choice 7

2.4 In- and Out-of-Court Reorganizations 8

2.5 Bankruptcy Statistics 10

3 Literature Review **11**

3.1 Venue Choice 11

3.2 Capital Structure 13

3.2.1 Capital Structure in Financially Distressed Firms 14

3.2.2 The Findings of Stuart C. Gilson 14

3.3 The Restructuring Decision 15

3.4 Asset Sales 16

4 Data **17**

4.1 Leverage Data 18

4.2 Industry Leverage 20

4.3 Sample Characteristics 20

5 Empirical Methodology **26**

5.1 The Event of Interest and Event Window 26

5.2 Main Regression Models 27
5.2.1 Logistic Regression 27
5.2.2 OLS Regression 28
5.3 Variables 29
5.3.1 Accounting- and Market Value Variables 29
5.3.2 Venue Choice 30
5.3.3 The Restructuring Decision 31
5.3.4 Legislative Impact 32

6 Results **33**
6.1 Logit-Model 33
6.1.1 Sticky Leverage 35
6.1.2 Venue Choice 35
6.1.3 Non-Financial Firms 36
6.2 OLS-Models 36
6.2.1 Sticky Leverage 38
6.2.2 ΔEV, ΔBV and Assets 38
6.2.3 Venue and Industry 40
6.2.4 The Restructuring Decision 41

7 Methodological Concerns **42**

8 Conclusion and Further Research **44**

Bibliography **47**

A Appendix A **51**
A.1 Dip-Loan & Converted as Explanatory Variables 51
A.2 Regression Diagnostics 52
A.3 Variable Definitions 57
A.4 Descriptive Statistics 58
A.5 Leverage by Industry 59
A.6 Industry Distribution 60
A.7 Industry Overview 61

B Appendix B **62**

B.1 Absolute Priority Rule (APR) 62

B.2 Key Changes Following the BAPCPA 63

B.3 Fire-Sale Mechanics 64

B.4 Flaws With Common Leverage Ratios 65

List of Figures

4.1 Elimination Tree 18
4.2 Industry Adjusted Leverage 22
4.3 Median Time Spent Reorganizing (measured in months) 24
4.4 Sample Distribution (in %) 25

5.1 Event Study Illustration 26
5.2 Leverage Run-Up (Raw Leverage) 27

A.1 Heteroscedasticity Plots For Each OLS-model 53
A.2 Median Industry Leverage Ratio (BV) 59
A.3 Median Industry Leverage Ratio (MV) 59
A.4 Number of Observations in Our Sample (N=103) 61
A.5 Number of Observations in Full Sample (N=1,097) 61

List of Tables

2.1 Bankruptcy Statistics for Large Public Firms 10

4.1 Descriptive Statistics 21
4.2 Days Spent and Fees 23

6.1 Logit-Model 34
6.2 OLS-Model 37

7.1 Correlation Matrix for Leverage Variables 43

A.1 OLS-Model 51
A.2 Tests for Primary Specification 52
A.3 VIF Including Interaction Terms 54
A.4 VIF Excluding Interaction Terms 54
A.5 Four Alternative Specifications Where Only Leverage Variables are Swapped, all else is equal 55
A.6 VIF-Factors Between Leverage Variables 55
A.7 Alternative Specification with ΔEV Only 56
A.8 Alternative Specification with ΔBV Only 56
A.9 Summary of Variables 58
A.10 Number of Firms / Peers in the Data Set 60

B.1 Numerical Example 65

Introduction

In 2016, a total of 42 large public firms filed for bankruptcy in the U.S. - an all time high since 2009, when there were as many as 91 filings. Ever since the 1980s, there has been a significant increase in the default rates, and an increasing number of public firms file for bankruptcy. Academics have increased their efforts to understand how these firms deal with financial distress and how they are affected by the restructuring (Capkun and Weiss (2016), Ayotte et al. (2013), Kalay et al. (2007) and Gilson (1997)). In general, research on debt levels following Chapter 11 reorganizations has been scarce. Researchers have mainly focused on transactions costs, operating performance, personnel costs, ownership control and whether the process by which firms recontract can be more efficient (Gilson (1991)). This leads to our research question; *what factors impact capital structure and the probability of being over-leveraged following a Chapter 11 reorganization?*

Our event study methodology is based on the following hypotheses:

1. We expect post-reorganization leverage to be chronic when firms recontract under Chapter 11. Therefore, we test if, and potentially why these firms tend to remain highly leveraged.

2. We assume that venue choice and reorganization method might explain post-reorganization capital structure. This assumption is tested by investigating whether courts perceived to be debtor-friendly really act in the interest of equity holders.

3. Asset liquidations are unlikely to be done at advantageous prices for debtors. Consequently, we expect that reductions in assets lead to the adverse effect of increased leverage, especially for firms with significant intangible assets.

4. Amendments affecting the bankruptcy process were passed by the U.S. Congress in 2005, possibly making the process more creditor-oriented. Our hypothesis

is that these changes lead to increased leverage for firms successfully emerging following this amendment.

We use two types of regression models to test our hypotheses. The probability that a firm will emerge with more leverage than its industry following a restructuring is assessed using a logit-model. Further, we examine to what extent these firms are over-leveraged by comparing their leverage to the industry median using an OLS-model.

This thesis makes several interesting findings. Analyzing leverage ratios for all 103 firms that filed for and emerged from Chapter 11 as public firms during 1990-2013, we present evidence that firms in general end up with more leverage than their peers if they were highly leveraged to begin with. Our results indicate that changes in firm value are a significant component in explaining post-reorganization leverage, and that increases in the market value of firms benefit the creditors on average. When the petition is filed in the Southern District of New York or Delaware, post-reorganization leverage is lower, consistent with these venues being considered debtor-friendly. Lastly, evidence shows that firms with twice as much leverage as the industry median at the time of filing are up to $\sim$32 times more likely than others to be highly leveraged when emerging.

To the best of our knowledge, the only paper that performs a similar study on the U.S. market is Gilson (1997). However, his analysis and scope deviates substantially from ours. In his paper he examines 108 publicly traded firms that recontracted under Chapter 11 and out-of-court between 1980-1989. He finds that transaction costs discourage debt reductions for firms restructuring out-of-court restructurings, and suggest that leverage ratios remain high when firms restructure privately since these costs are higher in out-of-court processes compared to Chapter 11. Consequently, he finds that debt reductions in Chapter 11 are greater, causing less recurrence of financial distress when firms restructure under Chapter 11.

Additionally, a paper focusing on control benefits and CEO discipline by Thorburn and Eckbo (2003) report post-bankruptcy leverage for 115 private Swedish firms auctioned as going concerns during 1988-1991. They present evidence that the auctioned firms emerge more highly leveraged than their industry peers, and that they tend to stay

highly leveraged for several years after emerging. However, this thesis is likely the first paper to thoroughly examine both pre- and post reorganization leverage using recent data from the U.S. market.

The rest of this thesis is structured as follows; section 2 provides a brief introduction on the fundamental aspects of Chapter 11. In section 3 we review related literature on reorganization and financial distress. We then present our data and empirical methodology in section 4 and 5. Lastly, the results are presented in section 6 alongside robustness checks in section 7, before we conclude our thesis in section 8.

Theoretical Aspects

The following section provides a useful introduction to fundamental aspects of Chapter 11 reorganization, that are important to understand how distressed firms reorganize and their implications for post-bankruptcy leverage.

2.1 The U.S. Bankruptcy Code and Chapter 11

Bankruptcy is essentially the legal process of settling claims from lenders (creditors) against a firm (debtors) in the event of default. In the U.S., two types of corporate filings exist, Chapter 7 and Chapter 11. Chapter 7 concerns liquidation, often referred to as straight bankruptcy. Chapter 11 offers protection from the rights given to creditors under Chapter 7, and is often referred to as bankruptcy protection. A reorganization starting out under Chapter 11 may at any point be converted to liquidation under Chapter 7, if it becomes evident that a successful reorganization is out of reach. Theoretically, converting from Chapter 7 to 11 is possible, but it occurs very rarely.

The rationale for introducing Chapter 11 is that the value of a firm is often higher as a going concern than as a sum of the parts. Essentially, Chapter 11 allows a firm to remain operational when reorganizing its capital structure. However, there are certain restrictions imposed by the courts when operating a firm under reorganization. This includes not being able to take on additional debts or sell critical assets without prior approval from the courts. Since debtors seek protection from creditors, the filing is usually voluntary. After the bankruptcy petition is filed, creditors trying to collect payments for debts incurred prior to filing could be considered being in contempt of the court. This is known as an automatic stay, and prevents creditors from realizing claims owed by debtors.

When reorganizing, a trustee may be appointed by the court, but the debtor (often the CEO) is allowed to operate as its own trustee. Said trustee may seek assistance from

other professionals such as lawyers and accountants to gain an overview of the firm's financial position. The fees paid are restricted, but the total cost of a Chapter 7 or 11 process is still substantial. After filing for Chapter 11, the debtor (or trustee if appointed) is granted a maximum of 18 months to draft a plan of financial reorganization that has to be accepted by the creditors for the plan to be put into effect. Acceptance is achieved when there is simple majority measured by claims, and 2/3 (measured by the amount of claims) are in agreement.

In certain cases, the court may confirm the plan even if an impaired class of unsecured creditors has voted against it. This is referred to as the Bankruptcy Code's "cramdown" provision. Specifically, the plan must propose a method classifying the claims for each class of creditors, as well as outline how the debtor will pay back these creditors over time based on this proposal. Consequently, creditors often create committees for the sole purpose of voting on plans laid forward by the debtor. Once the exclusivity period is over, creditors (e.g., hedge funds that have accumulated large stakes in the company's debt or trustee's) may propose competing reorganization plans. This could have implications for the outcome (post-reorganization leverage) seeing as how each asset class (equity holders and various types of creditors) have different incentives.

When proposing a plan of reorganization for Chapter 11, it is often assessed whether the firm is worth more as a going concern, as opposed to liquidation value (Chapter 7). If the plan is approved, this generally means that the court agrees that the liquidation value is lower than the going concern value, and that reorganization is feasible. Liquidation value is a firms value under the assumption that its assets are sold off during a short period of time. Additionally, valuations are often used when negotiating with creditors. E.g. when converting debt for equity is being considered, a valuation is important in assessing the rightful share for a creditor. In the context of the Absolute Priority Rule[1] (APR), the value of what a class of creditors receive in either debt or equity is especially important as this determines whether they have been paid in full. The different incentives of each asset class often causes valuations they

[1]A rule stipulating that all creditors (secured and non-secured) have seniority to equity holders. A violation therefore occurs when a reorganization plan distributes value to junior interests even though senior interests have not been paid in full

base their plans to be vastly different. Typically, this is reflected in the different plans being proposed by the different classes. In one example (Gilson (2010)) the debtor assumed an enterprise value of 866 USDm, as opposed to the unsecured creditors that placed the value at 1.6 USDb. This led to a so called valuation hearing where the judge ultimately ruled in favor of the unsecured creditors, who otherwise would have received next to nothing. In the event of all claims being settled entirely in cash, this is unlikely to pose the same issue.

Globally, the laws governing bankruptcy vary significantly. As opposed to many other countries, the U.S. made Chapter 11 worldwide in applying it to American firms and subsidiaries located abroad. Several nations have no laws for bankruptcy protection, but rather offers the choice between straight bankruptcy and an out-of-court restructuring. Notably, Norway's current reorganization laws do not offer protection from creditors, but allow secured creditors to collect payments by realizing their collateral. Neither do they give firms the possibility of funding operations through Debtor-In-Possession[2] (DIP) financing which is widely used in the U.S., possibly leading to a higher proportion of liquidation bankruptcies.

2.2 The Bankruptcy Abuse Prevention and Consumer Protection Act

The legal process throughout the duration of our dataset has undergone several changes. A large and significant change was made 17/10/2005, when the U.S. Congress signed into effect the Bankruptcy Abuse Protection and Consumer Protection Act (BAPCPA). Some key changes in the bankruptcy law following the new legislation includes limiting the exclusivity period for debtors' right to propose a reorganization plan. Pre-2005, debtors had the exclusive right to propose a plan during the first 120 days of a bankruptcy, with extensions often granted by most courts, leading to an exclusivity period of several years in practice. Post-2005 however, debtors must now file a plan within 18 months after filing for reorganization, and extensions are no longer granted.

[2]DIP-loan is additional financing obtained when reorganizing under Chapter 11 in order to fund operations. This claim is given the same priority as administrative claims, second to secured claims

By reducing the debtors exclusivity period, creditors are given the opportunity to impact the outcome of the reorganization if debtors are unable to implement a successful reorganization plan in a timely manner.

To a certain extent, this can lead to competing plans being proposed and voted on simultaneously. There have been several cases were competing plans are proposed. For instance, LightSquared, a high-speed network company had as much as four competing plans being voted on simultaneously. The plans were proposed by the company itself, a hedge fund which owned a significant number of shares, the banks, and an entity created by a competitor that owned debt in LightSquared. Pre-BAPCPA this would most likely not happen since the practice was to extend the exclusivity period for debtors, leading to few occurrences of competing plans.

Further, the BAPCPA also takes a stricter stand on filing for bankruptcy multiple times, especially for firms re-filing for Chapter 7 or 11 (Chapter 22s) less than one year after initially emerging from bankruptcy. Though one intent with the amendments was to both increase the speed and reduce costs for firms reorganizing, critics have in fact suggested that the BAPCPA in some ways made it more difficult for firms to successfully reorganize under Chapter 11 by putting greater demand on debtors' already constrained liquidity. One reason being that a change in how leases are treated now require firms to settle any existing defaults and other payables prior to assuming a lease. Additionally, they have a far more limited time-window to make this decision[3]. Consequently, they argue that more firms have opted for liquidation rather than attempt to reorganize, though we see no sign of this occurring in our data (see appendix B.2 for additional changes following the BAPCPA).

2.3 Venue Choice

When a corporation files for bankruptcy, its choice of possible venues is determined by the venue provision. Under this provision, debtors can file for bankruptcy in any of the

[3]Previously 60 days with repeated extensions, currently 120 days with only one possible extension of up to 90 days

following four locations[4]:

i The district where the corporation is domiciled

ii The district where the debtor has its principal place of business

iii The district where its principal assets are located

iv Any district where an affiliate of the debtor has already filed for bankruptcy

Thus, firms with multiple business locations have numerous options when selecting their venue. There are 94 federal judicial districts in the U.S. Since bankruptcy is not considered a state matter, only these may be considered bankruptcy courts. Consequently, firms have the option to engage in "venue shopping". In general, firms have used the flexibility of seeking their preferred venue since the 1980s, as both the court's expertise and judge's approach vary between districts. As a result, venue choice can have a significant impact on the overall outcome. Specifically, venues are often considered either creditor- or debtor friendly. A creditor-friendly bankruptcy court may for instance allow the liquidation of assets at a price below book value to cover debts, despite leaving debtors in a situation where leverage is increased. On the contrary, debtor-friendly courts may operate in an opposite manner, and are generally characterized by more frequent deviations from the APR in favor of shareholders. Therefore, the outcome (post-reorganization leverage) can be significantly different depending on where the petition is filed.

2.4 In- and Out-of-Court Reorganizations

Firms primarily reorganize through voluntary out-of-court processes or Chapter 11. The main difference between the two is related to (1) the fact that Chapter 11 is supervised by the court and (2) professionals that must adhere to a set of rules under the Bankruptcy Code. Generally, the restructuring method depends on the comparative benefits, costs of each option and the willingness of creditors to agree on a restructuring plan. Notably, most firms file for Chapter 11 after attempts to reach an out-of-court solution have failed (Gilson et al. (1990a)).

[4]Harvard Business School "Note on Bankruptcy in the United States" - 9-292-062

There are mainly three restructuring methods under Chapter 11; prepackaged, prenegotiated or the standard free-fall. A prepackaged bankruptcy is essentially a hybrid of the standard Chapter 11 and a private out-of-court reorganization, combining the most attractive features of the two methods. In this process, the restructuring plan has been submitted along with the bankruptcy filing, and the necessary votes to approve the plan are solicited. The only difference compared to a prenegotiated filing is that the necessary votes to gain acceptance from the bankruptcy court have not yet been solicited.

The advantage of these two types of restructuring over the traditional free-fall is that they reduce the amount of time spent in bankruptcy under court supervision. Consequently, they reduce professional fees and expenses attributable to the bankruptcy procedure. However, only fees incurred and time spent after filing are recorded in our dataset. All else equal, the total amount of time spent and direct costs of reorganization could be the same for all three types of filing. Considering this, and the fact that all plans of reorganization must be approved by the court, it seems unlikely that this should be a determinant for the outcome (post-bankruptcy leverage).

2.5 Bankruptcy Statistics

Table 2.1 provides a short summary of general statistics on companies that filed for Chapter 11 from 1980-2017. We observe that since the late 1990s, larger bankruptcy cases have mainly been filed in Delaware[5] and the Southern District of New York. Consequently, these venues have developed a reputation for expertise in handling larger cases (Ayotte and Skeel (2004)). We further observe that an ever increasing number of firms use prepackaged or prenegotiated types of filing. Notably, we see that in the time-period 2010-2017, 50% of filings were either prepackaged or prenegotiated. A possible explanation could be related to the changes implemented following the BAPCPA (see appendix B.2), making these types of filing more attractive.

Table 2.1: Bankruptcy Statistics for Large Public Firms

Filed	**N**	**Emerged**	**Liquidated**	**Remained Public**	**%Prepack/Preneg**	**%DE/NY**
1980-1989	88	71	13	10	2 %	28 %
1990-1999	267	194	55	111	30 %	48 %
2000-2009	514	328	159	165	28 %	60 %
2010-2017	201	124	47	33	50 %	66 %
Overall	**1 070**	**717**	**274**	**319**	**31 %**	**55 %**

[5]Following Continental's successful reorganization in Delaware, this venue has increased in popularity since the 1990s and achieved a dominant role in handling Chapter 11 cases. Additionally, most U.S. firms are incorporated in Delaware

Literature Review

The relationship between Chapter 11, transaction costs, ownership, as well as the process itself, are all fundamental topics that have been studied extensively. As previously mentioned, our paper analyzes leverage in financially distressed firms and attempts to identify the determinants of the restructuring with respect to capital structure.

Section 3.1 reviews literature regarding venue choices in Chapter 11, centered around evidence presented by Ayotte et al. (2013), LoPucki and Doherty (2002) and Weiss (1990). Section 3.2 discusses the capital structure choice for firms that are financially distressed both pre- and post-filing. Finally, section 3.3 and 3.4 briefly address the different restructuring methods and determinants for choosing a particular restructuring method, as well as the liquidation value of assets and determinants of debt capacity in firms.

3.1 Venue Choice

In contrast to past research, we find it interesting to compare pre- and post-reorganization leverage between venues since we know that the process and characteristics such as time spent varies across these courts. Our results in fact indicate significant differences for post-bankruptcy leverage depending on where the corporations file for Chapter 11.

There are numerous contributions to research on why publicly held firms choose certain venues, most of which disregard the consequence of these choices. As mentioned in section 2, firms often have a range of possibilities as to where to file for Chapter 11. Notably, the popularity of filing in Delaware and the Southern District of New York has been of particular interest among academics. Empirical research has found significant differences in characteristics such as refiling rates and time spent. In addition, judge's general experience and preferences have resulted in variation across venues (Ayotte et al. (2013)). However, past research on the topic is limited and not directly related

to our analysis. Therefore, a (new) key aspect is how venue choice affects firms' capital structure following a successful reorganization. Additionally, we discuss how potential differences in pre-filing leverage might influence the venue decision in our results.

Literature explaining why distressed firms file for Chapter 11 in Delaware include LoPucki and Doherty (2002), LoPucki and Kalin (2001), LoPucki and Theodore (2000), and Carapeto (2003). These papers present results indicating that filing in Delaware is popular for firms seeking expertise in larger cases as well as administrative efficiency. In fact, they present results indicating that a Delaware case is processed between 140 and 190 days faster than a case filed in another court. Further, Capkun and Weiss (2016) state that Delaware and the Southern District of New York are perceived as having a debtor-friendly bias. Even though these papers present results indicating that firms have a preference for Delaware and Southern District of New York, Ayotte and Skeel (2004) find no evidence of higher or lower success rates for firms reorganizing here, as compared to other venues. Further, they find no differences related to deviations from the APR in favor of the equity holders, a known governance issue in Chapter 11.

Over the past decades, Chapter 11 has evolved to become more creditor-friendly (Ayotte et al. (2013)). A paper by Bharath (2010) concludes that declining deviations from APR in favor of equity holders indicates the same. Skeel (2003) also argues that increasing creditor-control through Debtor-in-Possession (DIP) financing, combined with bonuses to key executives, explicitly tied to the reorganization process deter deviations from APR. A more recent study by Capkun and Weiss (2016) present conflicting results, who suggest more frequent violations to APR when secured creditors exercise control through DIP-loans. Despite varying results, there is a consistent hypothesis that the trend to file in Delaware is creditor-driven, in particular by secured creditors who prefer an efficient process. In our opinion, this could indicate that creditors are willing to trade control for speed and efficiency. The outcome of which could be lower post-reorganization leverage.

LoPucki and Theodore (2000), LoPucki and Kalin (2001) and LoPucki and Doherty (2002) introduce new control variables that might explain further differences by linking

venue choice to post-reorganization performance. These studies conclude that refiling rates in Delaware and the Southern District of New York were much higher than in other bankruptcy courts. However, as Rasmussen and Thomas (2001) argue, the main criticism of these studies is the reliance on refiling rates as a measure of both efficient and inefficient bankruptcy outcomes. There are several reasons for this criticism, and a prominent one is that not all financial distress will lead to a Chapter 11 filing. Even though a firm successfully reorganizes without refiling, it may very well have become financially distressed and e.g. acquired following Chapter 11. Further, LoPucki and Kalin (2001) argue that since refilings are both costly and condemned by the U.S. Bankruptcy Code, it is a criteria for unsuccessful reorganization. In contrast, Rasmussen and Thomas (2001) states that this is not the case, and that the code only requires reorganization plans to be unlikely to lead to a second reorganization. This was one of the significant changes with the BAPCPA in 2005. Previously firms could refile without penalty, but following the new provisions courts penalize firms refiling within a year of emerging by removing the automatic stay after 30 days. For our sample, this could lead to lower post-bankruptcy leverage following the implementation of the amendments, since high leverage is associated with higher probability of distress. In short, the BAPCPA-changes may therefore act as a deterrent for firms emerging highly leveraged by taking a harsher stance on "Chapter 22s".

3.2 Capital Structure

Firms that reorganize under Chapter 11 have the opportunity to affect its new capital structure by negotiating with creditors under the court's supervision. Capital structure theory is central to our thesis since financial distress can be a direct result of leverage. Even if we acknowledge that leverage cannot be increased indefinitely as the expected cost of financial distress grows exponentially (DeMarzo and Berk (2013)), results presented in our thesis indicate that post-bankruptcy leverage remains high. As Gilson (1997) points out, a key question is why most of these firms choose to increase or retain their leverage above their industry median when they have the opportunity to reduce it.

3.2.1 Capital Structure in Financially Distressed Firms

Literature that examines the relation between capital structure choice and firm value suggests that firms select a capital structure that maximizes enterprise value. The debate regarding optimal capital structure has been ongoing in financial literature since Modigliani and Miller (1958), with Titman and Wessels (1988) being one of the most cited paper in the matter. Titman and Wessels (1988) results are consistent with common theory suggesting that factors including the collateral value of assets, tax considerations, and profitability are among the main determinants for capital structure.

Another study by Andrade and Kaplan (1998) uses a sample of 31 highly leveraged transactions that later became financially distressed. They present findings suggesting that relatively few firms experience financial (not economic) distress because they are highly leveraged. Consequently, they conclude that these results may implicate that as long as the tax- and incentives benefits associated with debt are greater that the potential costs of bankruptcy for the firm, firms should have a high portion of debt in their capital structure. Therefore, when determining the optimal mix between debt and equity, Andrade and Kaplan (1998) suggest that low expected costs of financial distress is a possible explanation for why firms become highly leveraged to begin with.

3.2.2 The Findings of Stuart C. Gilson

A publication relating transaction costs and debt reductions in Chapter 11 is Gilson (1997) - "Costs and Capital Structure Choice: Evidence from Financially Distressed Firms". Examining 108 publicly traded firms that recontracted both under Chapter 11 and out-of-court during the 1980-1989 period, Gilson finds that transactions costs are smaller in Chapter 11 compared to out-of-court processes. His findings indicate that transactions costs have no direct impact on leverage in Chapter 11[1] on an isolated basis. However, he shows that leverage decreases significantly when firms recontract in Chapter 11, compared to out-of-court where these are significant. Gilson further investigates leverage ratios before and after the recontracting period. His results

[1]Transaction costs are generally assumed to be small relative to other determinants of capital structure (Titman and Wessels (1988)). The statement is also in line with Miller's (1977) argument that costs and benefits associated with this decision are small

indicate that firms recontracting from Chapter 11 remain highly leveraged. However, as opposed to out-of-court reorganizations, his analysis implies that leverage is *not* "sticky" for firms recontracting in Chapter 11.

As Gilson states, there are two possible explanations for why high leverage is seemingly chronic: Either **(1)** *firms realized greater benefits from debt, so their optimal target leverage ratios increased*, or **(2)** *high transactions costs made it disadvantageous for firms to reduce their debt*. Therefore, we hypothesize that increases in optimal leverage for an industry could plausibly explain the leverage developments reported in table 4.1. Additionally, studies supporting tax benefits associated with increased debt in the recontracting period could imply that the market value of these firms is maximized by keeping leverage high (Andrade and Kaplan (1998)). However, distressed firms often have larger Net Operating Loss carryforwards (NOLs) than non-distressed firms. As Gilson points out, since NOLs are normal in distressed firms along with decreasing firm value, NOLs are positively correlated with leverage. In short, he states that the denominator of the leverage ratio decreases, often leading to an increase in leverage when NOLs increase. This may be an additional explanation for high leverage in firms exiting Chapter 11. As pointed out by other researchers, another possible explanation for high leverage is the benefit of added discipline and control that high leverage imposes on management (Jensen (1986), Stultz (1990) and Gilson (1997)).

3.3 The Restructuring Decision

Though we acknowledge previous research attempting to explain the differences between out-of-court reorganizations and Chapter 11, we observe that these papers solely study the determinants of choosing one over the other. In particular, these studies fail to mention the implications of the restructuring decisions, and how these affect leverage characteristics when (if) the firm emerges.

For instance, Chatterjee et al. (1996), Jensen (1989) and Gilson et al. (1990a) examine firms' restructuring options and provide evidence that the restructuring decision depends on liquidity, the proportion- and complexity of debt and the degree of distress. Gilson

et al. (1990a) and Jensen (1989) relate restructuring decisions to their respective costs, and present evidence indicating that the high restructuring costs of Chapter 11 leads to an incentive to reorganize out-of-court or through a prepack which is known for consuming less time.

3.4 Asset Sales

A paper by Williamson (1988) identifies a key component in the liquidation value of assets; redeployability. He states that in the event of default, a determinant for the recovery value a creditor is able to achieve, is asset specificity. Specifically, he states that as asset specificity increases, the redeploability and hence recovery value declines. His conclusion is that highly specific assets are generally funded by equity, and assets with higher redeployability are funded by debt. Another paper by Shleifer and Vishny (1992) elaborates Williamson (1988) further by relating this to debt capacity. They specifically examine the liquidity of assets, as well as the liquidation value these are able to fetch during asset sales. Their findings indicate that asset liquidations do not necessarily achieve the best price since buyers are not always able to fully utilize the assets. Further, they conclude that asset liquidity is a significant determinant for debt capacity, since it among other things determine the recovery value for creditors. Specifically, they relate the liquidity of assets to possible industry wide recessions. One of their examples state that when industrial firms experience the need for asset liquidaitons, the rest of the industry is likely to do the same. Consequently, the market for these assets becomes illiquid, and prices fall. For our analysis, this is highly relevant as we attempt to control for the impact on leverage by changes in asset value. Further, we deploy a proxy variable designed to eliminate firms with significant intangible assets, since these are highly unlikely to be liquidated when firms experience financial distress.

Data

We use data from the UCLA-LoPucki Bankruptcy Research Database (BRD) (LoPucki (2017)). The database contains entries from 1,097 large[1] public firms that have filed for bankruptcy or reorganization since October 1, 1979 in the U.S. Since we choose to cover the years 1990-2013[2], our sample selection starts with 982 firms that filed for Chapter 11 this period. We follow each sample firm over an event window that begins five (T-5) fiscal years prior to filing for Chapter 11 (T). If the firm successfully emerges from Chapter 11 and remains public, data obtained three (T+3) fiscal years after emerging is collected. This methodology is consistent with Gilson (1997), who states that firms experience declining stock prices (Aharony et al. (1980)) and hence increased leverage, four years before they file. Further, we assume that firms reach a steady-state three years after emerging.

For a firm to be included in our sample, we first require it to be publicly traded both before and after reorganization. Thus eliminating 673 firms that were either liquidated, acquired or went private during the recontracting period. Secondly, we require information in COMPUSTAT on liquidity (represented by a closing stock price at the end of a fiscal year), common shares outstanding, and asset- and debt values to be available in our estimation window (eliminating another 206 cases). These restrictions jointly eliminate 879 cases, for a final sample of 103 observations[3] from the period 1990 through 2013. See figure 4.1 for an illustration.

[1]LoPucki criteria for companies to be included in the database: "We consider a company large if that Annual Report reported assets worth $100 million or more, measured in 1980 dollars (about $291 million in current dollars)"

[2]Since Gilson covers until 1989, we choose to exclude his sample selection so that results may be compared in an unbiased manner

[3]There are two instances of firms filing for bankruptcy twice and successfully emerging as public firms. For example, Salant Corporation initially filed for Chapter 11 in 1990, and emerged as a public firm three years later. It refiled for Chapter 11 in 1998, before it emerged as a public firm in 1999. Finally, the firm was acquired by Perry Ellis International in 2003

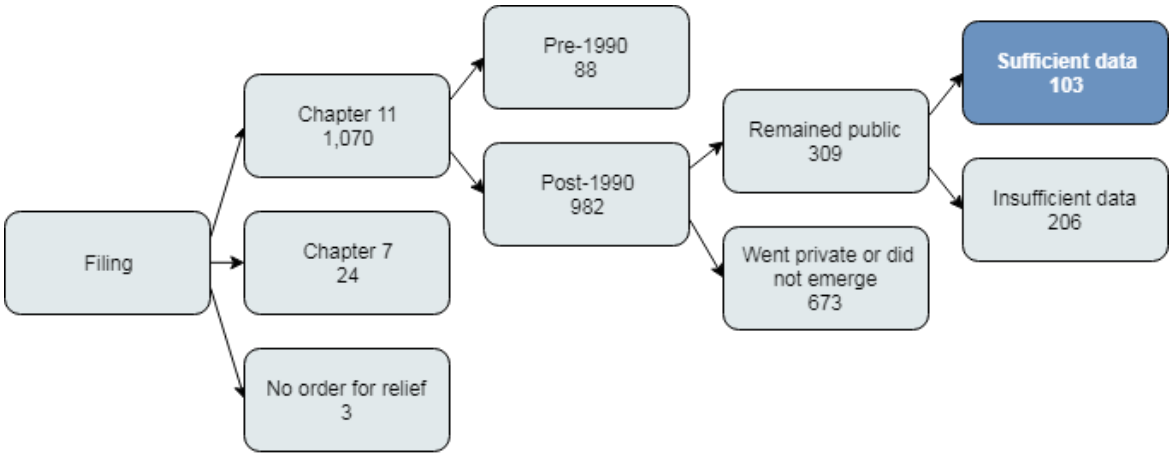

Figure 4.1: Elimination Tree

Note: Of the 673 companies, 337 went private, and the remaining 336 were either liquidated (261), never emerged or their status was pending/not updated in the LoPucki BRD

4.1 Leverage Data

We extracted financial data from COMPUSTAT, a global database of financial- and industry data for public firms. As mentioned above, we require the firms to meet certain criteria related to annual accounting data and liquidity in order to include them in our calculations. The firms must have closing market prices for the end of the fiscal year, which ensures that we match book value data with market data. For certain firms, this is not the case, and consequently these are all dropped. Firms not reporting the necessary accounting data for one or more time periods are dropped as well. Considering data extracted from COMPUSTAT is retrieved as reported accounting numbers, we calculate e.g. leverage ratios and market capitalization following extraction.

Leverage is calculated using both market- and book values. Consistent with Chatterjee et al. (1996) and Gilson (1997), we examine long-term debt relative to both assets $\frac{D}{AT}$ and market values[4] $\frac{D}{EV}$ pre- and post reorganization. Admittedly there are some factors (NOLs and investments in associates) that are not addressed in the transition between enterprise- and equity value. This could lead to a bias since the peer firms are not in financial distress, and may in general have less NOLs. However, the outputs produced by COMPUSTAT limit our possibility to extend this particular analysis.

[4]Where Enterprise Value$_t$= Market Cap$_t$ + $Long-Term\ Debt_t$–$Cash\ and\ Equivalents_t$. Since we assume the market value of debt and cash and cash equivalents to be equal to its book value, the only difference between book- and market value is equity

Since this applies to all firms and peers in our dataset, we see little to no reason there should be any biases arising from this calculation.

Long-term debt extracted by COMPUSTAT is defined as the total amount of debt obligations due in more than one year[5], For certain firms, obtaining market values on debt through outstanding bonds would be possible. However, this would not necessarily represent the total amount of financial debt in a firm since it may very well use other sources of debt. Therefore, we believe book value of total long-term debt is a better representation of financial debt. Additionally, Sweeney et al. (1997) finds that the potential errors caused by using measures based the on book value of debt are few for cross-sectional studies, though some variation exists in time-series.

By using long-term debt as the measure for leverage in a firm, we implicitly state that it represents its financial debt. These measures are widely used by researchers, though some consider them to be flawed. Myers (1984) finds that the use of long-term debt as a proxy for financial debt effectively counts non-financial debt as equity in the context of leverage ratios. This implies that if a firm increases non-financial debt (e.g. accounts payable) it will decrease its leverage. For a further elaboration on this and an explanation for why we believe it is not a problem in this thesis, see appendix B.4.

[5]With the exception of notes payable within one year when carried as a non-current liability

4.2 Industry Leverage

In order to calculate leverage for the industries, we rely on two-digit SIC-codes[6] to extract the aforementioned information needed to calculate industry median leverage. The industry median leverage ratio is obtained by first calculating the leverage ratios for all public firms with the same two-digit SIC code, provided there are at least ten firms in the industry. The number of firms included in our data sample for each industry[7] is indicated in appendix A.6. Further, extreme outliers as well as those with insufficient data were removed in order to give an unbiased picture of what the median capital structure looks like from year to year. This is used to determine whether a firm is above or below the industry median, in addition to how leveraged the sample firms are compared to the norm.

By pairing the specific firms' leverage to their industry median, we are able to assess the relative effect the restructuring process may have on firms' capital structure (akin to a difference-in-difference methodology). This mitigates the potential issue of stating that changes in leverage are high or low, when they could be in line with the development of the industry's leverage. Implicitly, we rely on the industry median to represent the optimal capital structure at any given time. A more detailed overview of leverage for each unique NAICS-group can be found in appendix A.5.

4.3 Sample Characteristics

In this section we describe the characteristics of our final dataset and calculated variables. Specifically, we report median leverage ratios before and after these firms have reorganized under Chapter 11. Next, we compare these results to the firms' respective industries. Finally, we present a more detailed summary of the sample by outlining where, when and how these firms reorganize.

[6]SIC is a system for classifying industries by a four-digit code, whereas the first two digits indicate the major group

[7]We have grouped the two-digit SIC codes following the NAICS Association guide - ref: https://www.naics.com/sic-codes-industry-drilldown/

Table 4.1: Descriptive Statistics

		Median Leverage Before		Median Leverage After		% of Firms Exceeding Industry Leverage		Industry Adjusted Leverage	
Filing Year	**N**	**BV**	**MV**	**BV**	**MV**	**BV**	**MV**	**BV**	**MV**
1990-1994	24	26 %	41 %	36 %	52 %	54	67	7 %	23 %
1995-1999	13	42 %	51 %	26 %	51 %	69	69	14 %	29 %
2000-2004	38	39 %	47 %	38 %	49 %	76	79	21 %	23 %
2005-2009	21	32 %	58 %	31 %	44 %	67	86	15 %	21 %
2010-2013	7	41 %	44 %	51 %	65 %	86	86	37 %	57 %
N	**103**	**34 %**	**46 %**	**36 %**	**51 %**	**69**	**77**	**18 %**	**26 %**

Note: **BV** and **MV** measure Book- and Market Value respectivly, whereas *% of Firms Exceeding Industry Leverage* and *Industry Adjusted Leverage* is measured as the median *After* firms have recontracted from Chapter 11

In line with the results presented by Gilson (1997), we observe from table 4.1 that the reorganized firms on average end up with a substantially higher leverage ratio measured by market value (MV) than they had prior to filing for most time periods. When measuring using book value (BV), we see the same tendencies for the time-periods 1990-1994 and 2010-2013. Interestingly, it also appears that these firms have leverage ratios above their industry when they emerge from bankruptcy, suggesting that leverage increases are not parallel to industry levels. Measured by both BV and MV, median industry adjusted leverage is greater than zero following reorganization (18% and 26% for the full sample). When examining the industry adjusted leverage (i.e. by how many percentage points their leverage exceeds the industry they belong to when emerging) we observe that not only do firms have more leverage than their peers, but in fact they have a median of up to 57 percentage points higher leverage. Hence, it seems that once firms encounter financial distress and become highly leveraged, the leverage ratios seem to persist. For the full sample of 103 firms we observe that they exceed the industry median by as much as 20% five years prior to recontracting, and 26% three-years after measured in market values (see figure 4.2).

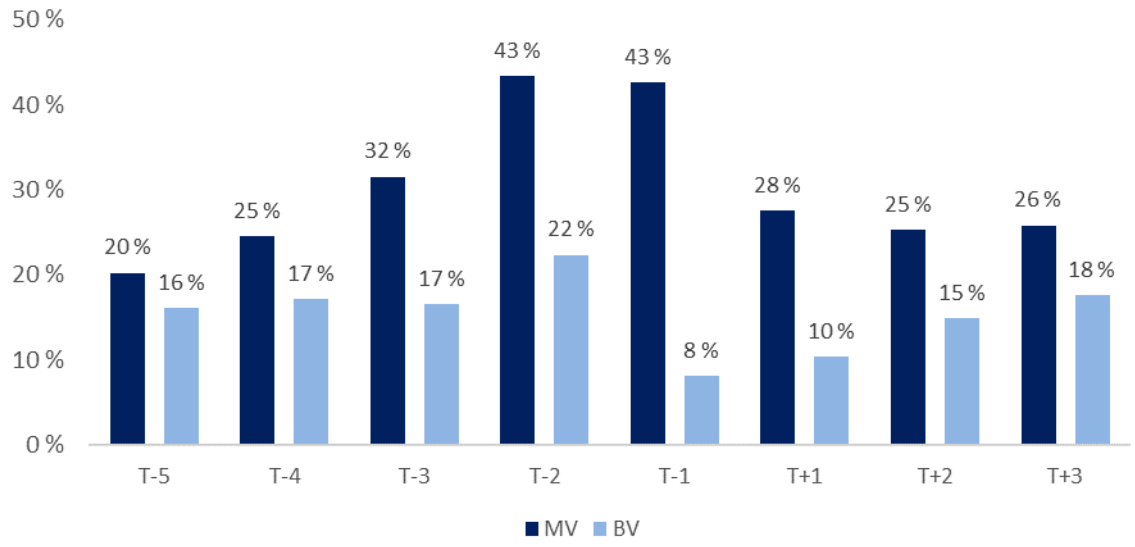

Figure 4.2: Industry Adjusted Leverage

Table 4.2 provides information about fees and days spent in Chapter 11 for the different types of bankruptcy filings, as well as the venue where the petition is filed. Table 4.2 shows that 10% of the filings are prepackaged, whereas 30% are prenegotiated, and the remaining 60% are filed as standard free-fall reorganizations. Prepackaged and prenegotiated bankruptcy filings tend to be quicker (Tashjian et al. (1996), Thorburn (2000))[8], and the median time spent restructuring in bankruptcy is only ∼4 months (mean 4.7 months) in our sample. The direct costs of prepackaged bankruptcy cases are also relatively low compared to other methods, as shown in table 4.2. Because prepackaged and prenegotiated filings are drafted and voted on in advance by all the impaired classes, it comes as no surprise that the direct costs are lower for these cases. However, we are unable to observe the costs incurred prior to filing when firms reorganize privately. Consequently, this may results in the actual direct costs and time spent being underestimated, all else equal.

[8]As pointed out by Eckbo et al. (2016) this is perhaps reflecting that the firm is somewhat less distressed or has a less complex claim structure

Table 4.2: Days Spent and Fees

	Type of Filing		**Venue Choice**			**Full Sample**
	Prepack/Preneg	Free-Fall	Delaware	SDNY	Other	Chapter 11
Median (mean) days	121 (142)	587 (775)	283 (570)	553 (517)	400 (468)	399 (523)
Median (mean) fees in % of assets	1.89 (2.10)	2.51 (3.68)	2.86 (3.47)	2.22 (2.33)	2.26 (2.64)	2.42 (2.92)
N (in % of the full sample)	**41** (40%)	**62** (60%)	**42** (41%)	**29** (28%)	**28** (31%)	**103** (100%)

Note: We have grouped Prepackaged and Prenegotiated. As mentioned in section 2.4, we find the difference between the two to be insignificant in this context. Using a two-sample t-test we find that the difference between Free-Fall and Prepack/Preneg is highly significant ($t = 6.5$).

Given that filing for Chapter 11 is generally initiated by the firm, it comes as no surprise that the two debtor-friendly districts the Southern District of New York and Delaware process 69% (41%+28%) of the 103 filings. To put this number into perspective, there is a total of 94 bankruptcy courts in the U.S., and debtors may choose freely under many circumstances (see section 2.3). Given that creditors prefer speed and efficiency, we observe as expected that Delaware is the busiest bankruptcy court in our sample, processing 41% of filings since 1990.

Since the BAPCPA changes limits the debtor's exclusivity period to 18 months and extensions are no longer granted, we would expect to see more firms filing in Delaware after 2005 given that this venue is known for processing filings quicker. 39% of petitions after 2005 are filed in this venue[9]. As mentioned in section 3, we observe that Delaware proceedings are up to 270 days quicker (553 - 283 days seen in table 4.2) than cases filed elsewhere[10].

In addition, we observe that filing in Delaware is slightly more expensive in terms of direct costs. In table 4.2, the duration of the bankruptcy proceedings defined as the time between filing and emerging from Chapter 11 (A $\rightarrow$ B in Figure 5.1) is a median of $\sim$13 months (average $\sim$17 months). Compared to Gilson (1997), who finds that the median bankruptcy lasts for 23 months, it seems that time spent in Chapter 11

[9]Consistent with LoPucki and Theodore (2000) we also observe (not reported in the table) a higher refiling rate for firms filing in Delaware (DE) and Southern District of New York (SDNY). In our sample, DE (50%), SDNY(29%), Other (21%)

[10]Measured in median. There are a few instances of long bankruptcy cases in Delaware affecting the average number of days; W.R. Grace Company emerged from bankruptcy after nearly 11 years and Owens Corning's that used 6 years. Both of which where driven into Chapter 11 by asbestos liabilities

has decreased gradually from an average of ∼16 months in the 1990s to ∼4 months in the period 2010-2013 (see graph 4.3, the difference is significant at 5 percent level). A partial explanation could be that a higher percentage of filings from 1995-2004 compared to 1990-1994 were either prepackaged or prenegotiated, both of which are processed significantly faster than free-falls (table 4.2). A further explanation could be related to firms' much shorter window (post-2005) in which debtors have exclusivity to propose a reorganization plan (see section 2.2).

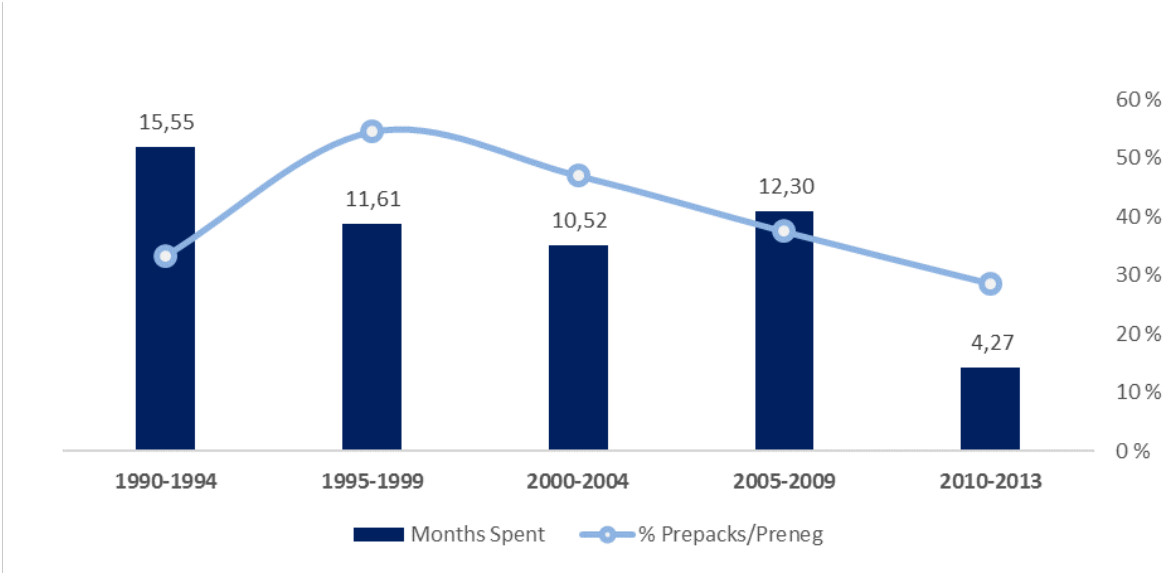

Figure 4.3: Median Time Spent Reorganizing (measured in months)

Note: Average months in bankruptcy went from 20.54 in 1990-1994 to 7.57 in 2010-2013. Using a two sample t-test for 1990-1994 against 2010-2013 (t=2.06)

Shown in table 4.2, we also observe that the average fees associated with Chapter 11 of are 2,92%[11]. The results are consistent with prior studies by Lubben (2000) who estimates direct costs of restructuring to 2.5%[12] of asset (book) value. Another paper by Weiss (1990) estimates the same costs to be close to 3% of enterprise value. In these studies and table 4.2, only direct costs are observed. These are costs associated with expenses attributable to the reorganization, consisting mostly of legal- and professional fees. A key problem is therefore related to indirect costs[13] which are difficult to measure and directly observe, and the significance of these in a reorganization still remains an

[11]Measured as total professional fees and expenses attributable to the bankruptcy reorganization divided by total assets (BV) from the last 10-K filed before bankruptcy, consistent with Lubben's methodology

[12]The estimate has excluded prepackaged cases. When including prepacks the estimate is 1.8%

[13]Indirect costs are reorganization costs not directly attributable to a specific item. E.g. lost profits from foregone sales and decline in firm value

unresolved issue (Kalay et al. (2007)).

Though not reported in the table, we observe two instances of registered 363-asset sales in our data[14]. Consistent with Ofek (1993), Kruse (2002) and Gilson (1997) who argue that asset sales are associated with debt reductions, we observe that the two firms in fact end up with less leverage (29 percentage points) after recontracting from Chapter 11 compared to the full sample. Given that firms' relative portion of equity increases when assets are sold at (or above) book value to reduce debt, this corresponds with intuition.

Lastly, the overall distribution of our 103 firms appears to be fairly representative for the full sample of 1,097 firms in terms of industry distribution (see figure 4.4). Hence, it seems that our dataset is unbiased in terms of industry coverage. The four largest industries are; Manufacturing (39%), Transportation, Communication, Electric, Gas (16%), Services (14%), Finance, Insurance & Real Estate (10%). Even though a high amount of filings are from Manufacturing, we have 45 different sub-groups when distributing by the two-digit SIC codes, leading to a far more even distribution of the firms.

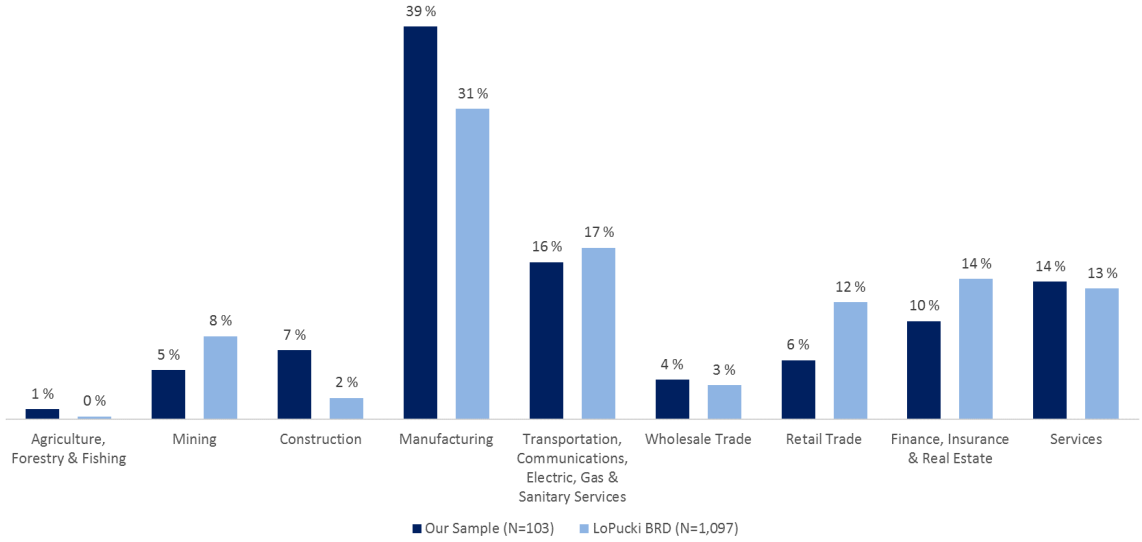

Figure 4.4: Sample Distribution (in %)

[14]ICH and General Motors

Empirical Methodology

In the following section we present the methodology used to perform our cross-sectional regressions for the public to public reorganizations. There are two main objectives for this exercise. The first is to assess the probability that a firm will be over-leveraged[1] following a restructuring. The second objective is to examine to what extent these firms are over-leveraged, measured as both percentage points above the industry median and raw leverage. In particular, we aim to investigate why firms remain highly leveraged by relating pre- and post leverage levels, as well as variables that potentially affect leverage.

5.1 The Event of Interest and Event Window

The length of the estimation window is a tradeoff between being able to get a good estimate of the "normal" leverage ratio both pre- and post reorganization in addition to excluding older, non-relevant data that may affect the results. Consistent with the methodology used in Gilson's '97 study, sample firms must have filed a 10-K five years before the bankruptcy date and three years after (see figure 5.1).

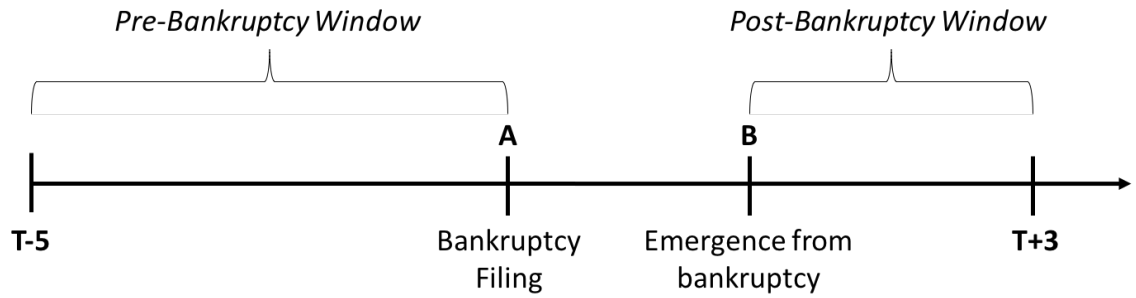

Figure 5.1: Event Study Illustration

This is to ensure that the leverage ratio accurately reflects these firms' normal state prior to bankruptcy filing. By using this methodology, we also mitigate the potential issue of e.g. firms increasing leverage significantly in order to fund projects, only to

[1] Assuming the industry median represents optimal capital structure at any given time

file for Chapter 11 in a year or two. Furthermore, as illustrated in figure 5.2, leverage generally increases in the years leading up to a bankruptcy filing (T). In Gilson's '97 study the same was theorized but not observed. Interestingly, we see that book leverage (BV) on average falls a year prior to bankruptcy (T-1). This may be caused by firms already being in distress, and consequently unable to refinance long-term debt that comes due in the next year. Since only debt with maturity over a year will be counted as long-term debt (see section 4.1), this effectively converts long-term debt to short-term debt, causing observed leverage to fall. Hence, we choose to mitigate these potential issues by using a long event window and measure leverage in T+3 against leverage in T-5.

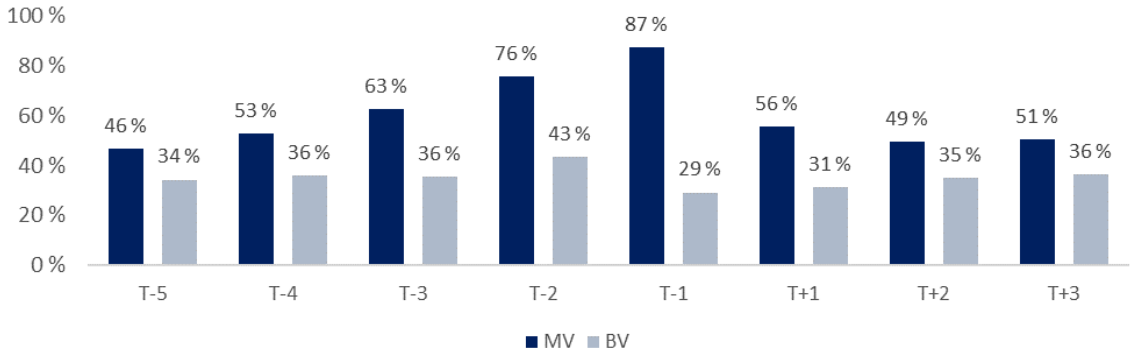

Figure 5.2: Leverage Run-Up (Raw Leverage)

5.2 Main Regression Models

Our final regression models are designed to test our hypotheses, as well as answering our main research question. Selected control variables are included to capture any unforeseen effects. This section is structured as follows; first an outline of both the logit- and OLS-model is presented, before the motivation for including certain variables and their expected results are presented in section 5.3. Finally, a number of diagnostic tests of relevance are performed, see appendix A.2 for more details on robustness checks.

5.2.1 Logistic Regression

We apply a logistic regression on the dependent binary variable *Above Industry Median* in order to estimate the likelihood of firms having leverage ratios above their industry median three years after emerging from bankruptcy (T+3). The OLS estimator will be

unbounded in its simplest form, which means that the outputs may indicate probability below 0% and above 100%. This is clearly not a desired output. The logistic regression model mitigates this issue by outputting the log-odds, and followingly parameters between 0 and 1. The logit-model can be examplified as follows:

$$ln\left(\frac{P(Y=1)}{1-P(Y=1)}\right) = \sum_{i=1}^{N} \beta X_i \tag{5.1}$$

In order to interpret the coefficients with a more familiar scale, we express the outputs as odds ratios

$$Odds = \frac{P(Y=1)}{1-P(Y=1)} = e^{\sum_{i=1}^{N} \beta X_i} \tag{5.2}$$

Consequently, when estimating the logistic model, the coefficients can be interpreted as the multiplicative change in odds ratio. A coefficient larger than one increases the probability of having a leverage ratio above the industry median. Hence, we logistically regress the binary outcome variable *Above Industry Median* (BV & MV) on various characteristics believed to affect firms' probability of being over-leveraged, in line with our hypotheses:

$$\begin{aligned} ln\left(\frac{Y}{1-Y}\right) &= \alpha + B_1 AdjustedLeverageBefore(BV) + B_2 Post2005 \\ &+ B_3 Prepack/Preneg + B_4 \Delta EV + B_5 \Delta BV + B_6 DE/NY \\ &+ B_7 Assets(BV) + B_8 NonFinance + B_9 DE/NY * \Delta EV \\ &+ B_{10} DE/NY * \Delta BV + B_{11} NonFinance * \Delta EV \\ &+ B_{12} NonFinance * \Delta BV \end{aligned} \tag{5.3}$$

5.2.2 OLS Regression

The second group of dependent variables we regress are *Industry Adjusted Leverage* (BV & MV). These variables shows by how many percentage points firms' leverage exceeds their industry median:

$$Firm\ Specific\ Leverage_t - Industry\ Median\ Leverage_t$$

The third and last group of dependent variable we regress is *Raw Leverage* (BV & MV), simply measuring the specific leverage firms have after they successfully reorganize. Our explanatory variables are the same across all dependent variables. (see equation 5.3)

5.3 Variables

In order to answer our research question, we empirically test our hypotheses, as well as including relevant control variables. In this section we introduce our variables of choice, as well as the rationale for including them in our regression model.

5.3.1 Accounting- and Market Value Variables

Our aim is to estimate the probability of firms ending up highly leveraged, as well as their capital structure after they recontract. We examine whether pre- and post bankruptcy leverage are significantly positively related, thereby controlling for sticky leverage in our sample firms. If this is the case then we expect *AdjustedLeverage-Before(BV)* to be larger than one in our logit-model and larger than zero for the OLS-specification.

In order to control for the effect firm size may have on both the probability of being over-leveraged as well as the amount of leverage, we have included *Assets(BV)* as an explanatory variable. The variable measures total assets (in billions) five years prior to filing. Since we find no evidence or reasoning for there being benefits of scale for firms reorganizing under Chapter 11, we expect this variable to be insignificant.

Further, we have included two variables (ΔBV and ΔEV) that measures the percentage change in both book- and market value through our event window. We include the two variables to capture whether changes in assets measured in book- and market values can explain the capital structure after a reorganization. We initially expect that firms who sell assets at book values in order to reduce their debts, will in fact reduce their

leverage. We are also able to control for our hypothesis stating that firms may be forced to sell assets at discounts to book value (cost), causing an increase in leverage (see appendix B.3 for a detailed explanation). Finally, we expect to see that increases in firm value on average benefits creditors since Chapter 11 is generally known for being a creditor-oriented process.

We also test whether firms with significant intangible assets will experience increased leverage when liquidating these. Therefore, *NonFinance* is included as a dummy variable equal to one if the industry is classified as non-finance. We expect that since financial firms have a low proportion of tangible assets, they will be significantly different from *NonFinance*, who can sell these assets to reduce leverage. That is, we expect that a reduction in assets for non-financial firms leads to a smaller increase in leverage. Therefore, we have included two interaction variables, namely *NonFinance* $* \Delta EV$ and *NonFinance* $* \Delta BV$ as we expect these variables to have a significant marginal effect on both ΔEV and ΔBV.

Finally, we aim to capture whether creditor-control has an effect capital structure when emerging. Consistent with Dahiya et al. (2003) and Ayotte and Morrison (2009), we use DIP-loan as a proxy-variable to measure this effect, and include it as a binary variable equal to one if DIP-loans were granted during reorganization. The sample selection for *DIPloan* is limited to 88 observations, and is consequently run in a separate regression along with *Converted*, a binary variable equal to one if firms with outstanding public bonds converted these to equity during bankruptcy.

5.3.2 Venue Choice

Considering the stated differences between venues both in time spent, experience and refile rates, we are particularly interested in how debt levels following a reorganization varies between different venues. We apply a dummy variable (DE/NY) equal to one if the petition was filed in Delaware or the Southern District of New York. The reason for not separating the two venues is that we do not find them to be statistically or intuitively different in this context as they are both considered "debtor-friendly". However, on a joint basis, the two are significantly different from other venues, hence

the rationale to group them together.

We also include the two interaction variables *DE/NY* * ΔBV and *DE/NY* * ΔEV to test whether changes in book- and enterprise value are affected differently in Delaware and the Southern District of New York, with the baseline being all other venues. The rationale is that these two venues are considered to be debtor-friendly. Hence, we would expect the interaction variables to show marginal effects in our OLS-models indicating that firms filing in these venues are able to (1) sell assets at or closer to book value, and (2) allow equity holders to absorb increases in firm value. With respect to the probability of firms being over-leveraged, we expect our logit-model to provide coefficients smaller than one, indicating that filing in these venues reduces the probability of emerging with leverage above the industry median.

5.3.3 The Restructuring Decision

As shown in section 4.3, prepackaged and prenegotiated reorganizations are generally resolved faster, in addition to having lower (reported) fees than standard free-falls. In order to control for different types of filing methods, we have deployed another dummy variable *Prepack/Preneg* equal to one if the filing was prepackaged or prenegotiated. However, we expect that the differences between them are unlikely to affect leverage outcomes differently. Given that the restructuring plan has already been drafted and submitted prior to filing for Chapter 11, we argue that whether the time was spent under court supervision or not, should not be an explanatory factor for leverage post-restructuring.

Further, we include a variable that is equal to one if the firms in our sample have converted their debt into equity during the bankruptcy restructuring (*Converted*). Considering that this information is only available for those that had publicly traded bonds outstanding, this particular sample is limited to 31 observations, of which 28 converted during reorganization. Consequently, we run these regressions separately along with the sub-sample for *DIPloan*. Because a firm that converts debt for equity mechanically should see a decrease in leverage, we expect that firms converting their debt will end up less leveraged. Thus, we expect a negative sign on the coefficient for

the variable *Converted* in our OLS-models.

5.3.4 Legislative Impact

We chose to divide our dataset into two periods; pre- and post-BAPCPA changes in order to capture potential differences caused by the legislative changes (section 2.2). We test our hypothesis that these changes led to greater creditor-control and as a consequence higher post-bankruptcy leverage. We do this by generating another dummy variable *Post2005*, equal to one if a firm filed for Chapter 11 after 2005. As mentioned in section 2.2, the BAPCPA included amendments such as a shorter exclusivity period for debtors, as well as other changes said to negatively affect firms' liquidity during the reorganization. On the other hand, since amendments implemented this year especially affected the retail industry (see appendix B.2 for key BAPCPA changes) and we only have six retail firms in our sample, the significance of these amendments may be limited.

Now that all the explanatory variables used in our regression are introduced, we will proceed to the results from our regression tables before we outline our robustness checks in section 7.

Results

In this section, we present the results of our empirical analysis of all 103 public to public reorganizations. We find the explanatory variables in equation 5.3 to be those of interest. Additionally, we have considered a number of alternative specifications detailed in appendix A.2.

Further, we comment on the variables of interest, as well as selected control variables. We then proceed to discuss the outputs produced by the interaction variables and the effects we attempt to capture through these. It is important to keep in mind that this section will only present the results. The robustness assessment (section 7) shows that these final models are the result of several specifications and statistical tests. Potential issues caused by including similar variables at the same time (e.g. ΔBV and ΔEV which have an R^2 of only 0.5194) are adressed in appendix A.2 (table A.4, A.7 and A.8) along with a comprehensive robustness check. Generally, the tests indicate that our results are both robust and significant.

We also acknowledge that the outcome of a restructuring will largely be affected by the negotiations between debtors and creditors. This is a parameter that is difficult to quantify, and we do not attempt to test this empirically.

6.1 Logit-Model

The results from our logit regressions are presented in table 6.1. In the following subsections we will explain the sign and magnitude of coefficients generated by the model, as well as our interpretations.

Table 6.1: Logit-Model

	Above Industry Median (T+3) *Logit Model (Odds Ratio)*	
	BV	**MV**
AdjustedLeverageBefore(BV)	31.77**	15.09*
	(48.04)	(21.70)
Post2005	2.155	2.027
	(1.378)	(1.416)
Prepack/Preneg	1.372	0.960
	(0.725)	(0.521)
ΔEV	4.459	6.158
	(10.93)	(14.35)
ΔBV	1.400	0.0534
	(2.594)	(0.133)
DE/NY	0.594	0.394
	(0.367)	(0.303)
Assets(BV)	0.974	1.102
	(0.0406)	(0.0667)
NonFinance	0.480	14.05**
	(0.950)	(18.69)
DE/NY * ΔEV	0.823	0.161
	(1.095)	(0.315)
DE/NY * ΔBV	2.355	5.636
	(2.539)	(8.234)
NonFinance * ΔEV	1.009	1.805
	(2.322)	(3.918)
NonFinance * ΔBV	0.254	3.392
	(0.414)	(7.353)
Constant Term (α)	3.623	0.260
	(7.499)	(0.333)
N	103	103
R^2	0.1847	0.1525

Standard errors in parentheses
Significance levels: ***, ** and * indicate 1, 5 and 10 percent.

6.1.1 Sticky Leverage

The logit-model reveals a significant link between pre- and post reorganization leverage as evidenced by the coefficient for *AdjustedLeverageBefore(BV)* ($B_1 = 31.77$ in column (1) and 15.09 in column (2)). Contrary to Gilson's findings in '97, we believe this constitutes evidence for sticky leverage in Chapter 11 restructurings. The coefficients generated by the logit-model are as indicated in section 5.2.1 odds ratios. This means that if a firm has pre-filing leverage of 10 percentage points above the industry median, it is 3.177 times more likely than others to be over-leveraged following a restructuring (measured by book value). The implication is the same for leverage measured by market value, with the corresponding coefficient being $B_1 = 15.09$.

Most models of capital structure state that the expected costs of financial distress deter firms from being too leveraged (DeMarzo and Berk (2013)). However, as mentioned in section 3.2, Andrade and Kaplan (1998) find conflicting results, making this difficult to acknowledge in practice. A possible explanation for why high pre-filing leverage seems to be chronic is related to low expected cost of financial distress. However, the paper by Andrade and Kaplan only examines leverage levels prior to filing. Therefore, we would expect that firms in our sample adjust their post-reorganization leverage in order to reduce the probability of filing twice. Nonetheless, only ∼11% of firms in our sample refile for Chapter 11, indicating that the decision to be substantially leveraged will generally be the same before- *and* after a reorganization.

6.1.2 Venue Choice

In section 3.1, we outlined research related to venue choice and its importance in the restructuring process. As mentioned in section 5.3.2, we would expect to see a reduction in the probability of firms being over-leveraged after emerging if they choose to file in debtor-friendly courts. However, since the coefficients DE/NY in table 6.1 (BV & MV) are both insignificant, we do not proceed to comment.

6.1.3 Non-Financial Firms

The coefficient for the binary variable *NonFinance* ($B_8 = 14.05$) is significant at the 5 percent level. The probability of firms' leverage exceeding their industry median measured by market value increases by 14.05 times if the firm is classified as non-financial. Initially, it could seem that these firms have higher debt capacity since their assets may have higher redeployability. However, the leverage is measured against the industry median which implies that their peers would have a similar debt capacity, making this an unlikely explanation.

6.2 OLS-Models

As opposed to the logit-models that estimate the probability of a firm being over- or under-leveraged, our OLS-models aim to measure by how much. Columns (1) - (4), show OLS-models for *Industry Adjusted*- and *Raw Leverage* respectively. An interesting observation when comparing to the logit-model is that they have significantly more explanatory power.

Table 6.2: OLS-Model

	Industry Adjusted Leverage (T+3) *OLS Model*		**Raw Leverage (T+3)** *OLS Model*	
	BV	**MV**	**BV**	**MV**
	(1)	**(2)**	**(3)**	**(4)**
AdjustedLeverageBefore(BV)	0.354***	0.277	0.250**	0.013
	(0.119)	(0.190)	(0.115)	(0.135)
Post2005	0.0422	0.095	0.019	0.061
	(0.056)	(0.101)	(0.061)	(0.088)
Prepack/Preneg	0.0935*	0.0901	0.0767	0.112
	(0.053)	(0.089)	(0.054)	(0.105)
ΔEV	0.188**	1.291***	0.406**	1.432***
	(0.089)	(0.290)	(0.176)	(0.299)
ΔBV	-0.358	-1.592***	-0.496***	-1.627***
	(0.248)	(0.293)	(0.178)	(0.345)
DE/NY	-0.0196	-0.269***	-0.033	-0.285**
	(0.062)	(0.096)	(0.058)	(0.131)
Assets(BV)	-0.000477***	0.000358	-0.000504	0.000486
	(0.000123)	(0.000888)	(0.000538)	(0.000366)
NonFinance	-0.072	0.166	-0.195*	-0.172
	(0.079)	(0.186)	(0.113)	(0.222)
DE/NY * ΔEV	-0.102***	-0.039	-0.115**	-0.019
	(0.038)	(0.089)	(0.054)	(0.100)
DE/NY * ΔBV	0.0545	0.121	0.0690	0.0815
	(0.061)	(0.126)	(0.076)	(0.134)
NonFinance * ΔEV	-0.0659	-1.233***	-0.277	-1.403***
	(0.084)	(0.281)	(0.170)	(0.294)
NonFinance * ΔBV	0.322	1.524***	0.450***	1.595***
	(0.251)	(0.281)	(0.170)	(0.343)
Constant Term (α)	0.138*	0.203	0.479***	0.816***
	(0.079)	(0.194)	(0.118)	(0.210)
N	103	103	103	103
R^2	0.319	0.399	0.307	0.378

Standard errors in parentheses (Column (1) and (4) use robust estimators)
Significance levels: ***, ** and * indicate 1, 5 and 10 percent.

6.2.1 Sticky Leverage

We see the same tendencies with persistent leverage as we saw in the logit-model. Since the coefficient for *AdjustedLeverageBefore(BV)* is above zero ($B_1 = 0.354$ in column (1)), this indicates that firms in general end up with more leverage than their peers if they were highly leveraged to begin with. The coefficient states that if a firm has 10 percentage points more leverage than its peers before filing, they will on average have 3.54 percentage points more when they emerge. When regressing the same model using *Raw Leverage* as a dependent variable, the interpretation of the coefficient ($B_1 = 0.250$ in column (3)) is that for each 10 percentage points of leverage above peers pre-filing, the $\frac{D}{AT}$ ratio increases by 2.50 percentage points for these firms, all else equal.

6.2.2 ΔEV, ΔBV and Assets

From table 6.2, we observe that the coefficients for ΔEV (e.g. $B_4 = 1.291$ in column (2)) and ΔBV (e.g. B_5 = -1.592 in column (2)) are contradictory for all OLS-models. We observe that increases in enterprise value (ΔEV) generally leads to higher leverage, possibly indicating that creditors absorb a significant proportion of firm value creation. This is in line with the notion that Chapter 11 is currently considered a creditor-oriented process. Measured in book value, the result is reversed. Supporting our hypothesis, the coefficients for ΔBV, indicates that a decrease in the book value of assets (perhaps caused by an asset sale), may lead to increased leverage, both raw and industry adjusted. At first, this may seem counter-intuitive, but as shown in appendix B.3, possible explanations are that (1), firms are forced to sell their assets at a discount relative to book value in order to pay down debts, or (2), firms have a significant portion of intangible assets that they are unable to convert to cash.

From column (1) in the OLS model, we further observe that the coefficients for the interaction variables *DE/NY* * ΔEV (B_9 = -0.102) and *DE/NY* * ΔBV ($B_{10} = 0.0545$) show results opposite to their respective stand-alone variables ΔEV and ΔBV. The interaction variable *DE/NY* * ΔEV offers evidence supporting our hypothesis that courts perceived as debtor-friendly approve reorganization plans more beneficial to shareholders. The marginal effect of venue choice shows that the seemingly debtor-

friendly courts on average allow a greater portion of firm value creation to be absorbed by the equity holders, compared to the baseline ΔEV. The sum of the coefficients for ΔEV and $DE/NY * \Delta EV$ in column (1) is 0.086, and 0.291 in (3). This shows that the overall outcome is that a smaller portion of firm value creation is absorbed by creditors when reorganizing in these venues, even when adjusting for industry median leverage.

Interpreting these coefficients may seem simple, but without information on equity ownership before and after reorganizing, it is not possible to conclude. In a number of recent reorganizations in the Norwegian market for offshore supply vessels, equity holders have been diluted significantly, with creditors seizing control of the firm[1]. Following this, the emerging firm will have low leverage, but the equity holders prior to distress are the real losers.

Further explanations for the impact of changes in firm value could be that in a debtor-friendly process, the existing management is typically appointed to be the trustees themselves (Ayotte et al. (2013)). When management has significant equity ownership prior to default, it intuitively has an incentive and the capability to safeguard theirs an other equity holders' interests. Core et al. (1999) show that CEOs generally have a significant stake in their employer's equity value. They also show that on average, executives' incentives are aligned with those of the shareholders rather than the creditors, as proven by the significant use of equity compensation. This may indicate that management chooses to maximize equity rather than enterprise value when reorganizing, and that the venue choice is a means to this end. On the other hand, if management believes creditors may control the firm post-reorganization due to e.g. debt conversion, their loyalty may shift towards them. Therefore, there is no guarantee that management incentives are aligned with those of the equity holders prior to filing, but most likely to those that ultimately take control of the firm. This has been observed previously in Gilson et al. (1990b), and the reason is possibly that not all plans of reorganization require approval from shareholders. Typically, reasons

[1]Norwegian geophysical company Polarcus restructured its balance sheet in 2016. Shareholders ended up owning approximately 12.6% of the newly financed firm, with bondholders converting to equity and owning the remaining 87.4% of equity

for seeking shareholder approval is either that the stock exchange requires it, or the number of shares to be issued is greater than the pre-authorized amount.

Addressing the potential effects caused by the tangibility of assets; we immediately see that the effect of the interaction variables designed as proxies for tangible assets (*NonFinance* * ΔEV and *NonFinance* * ΔBV) is opposite to their baseline variables (ΔBV and ΔEV). The coefficient in column (2) for *NonFinance* * ΔBV (B_{12} = 1.524) interpreted along with its corresponding baseline ΔBV (B_5 = -1.592) states that if a non-financial firm reduces its assets by 10 percentage points (i.e ΔBV = -0.10), industry adjusted leverage increases by 0.68 (-1.592 + 1.524 = 0.068) percentage points above the industry median. As the coefficients indicate, there is a significant difference compared to non-financial firms where the corresponding increase would be 15.92 percentage points above the industry median. Results are similar for raw leverage in column (4), thus offering evidence further supporting our hypothesis that firms with significant intangible assets will be less efficient in liquidating these in order to pay down debts.

In order to control for benefits of scale when reorganizing, we include the control variable *Assets(BV)* (B_7 = -0.000477) which is assets in USDb in T-5. Observing from column (1) in the OLS-model, firm size is relatively unimportant as the coefficient is close to zero. To illustrate the lack of impact; the marginal effect of a 1 USDb increase in assets before filing corresponds to a decrease of 0.0477 percentage points in *Industry Adjusted Leverage (BV)* when emerging. Clearly, the coefficients' size and magnitude indicates that there are grounds for the conclusion that firm size is not important in this context. This is in line with our expectations, given that we see no reason for there being benefits of scale when reorganizing in a large and liquid market like the U.S.

6.2.3 Venue and Industry

As shown in column (2) and (4) we observe that firms filing in Delaware or the Southern District of New York will experience greater debt reductions on average, as opposed to those filing elsewhere. This is evidenced by the coefficients (B_6 = -0.269 and -0.285) measuring leverage by market value. It could be caused by self-selection, meaning that management (debtors) choose to file in the debtor friendly venues themselves.

The industry variable *NonFinance* indicates that non-financial firms in general have less leverage when emerging, measured by *Raw Leverage (BV)* (B_8 = -0.195 in column (3)). This is not adjusted for the industry median leverage, and therefore we are unable to conclude whether this difference is parallel to industry wide developments or not. When assessing the corresponding coefficient for industry adjusted leverage, we see that it is insignificant.

6.2.4 The Restructuring Decision

When controlling for possible effects that the type of filing may have, we see that the general level of significance for the variable *Prepack/Preneg* is rather low as expected. However, the sign of the coefficient in column (1) ($B_3 = 0.0935$) is opposite to what we would expect. In table 6.2, *Prepack/Preneg* indicates that leverage increases if debtors use prepackaged or prenegotiated filing methods. A plausible explanation may be that creditors are able to exercise more power over debtors when unsupervised by the courts. However, the court ultimately has to approve the bankruptcy petition, regardless of restructuring method. Therefore, creditors' influence should generally be limited to what the courts allow.

Finally, debtors and creditors may opt for debt conversion as a restructuring tool. As mentioned, due to a limited sample size, the table including this variable as well as *Diploan* is found in appendix A.1 since these are both insignificant. Likely due to the low sample size, we do not find these results to be grounds for conclusion, even though they coincide with intuition.

Methodological Concerns

Our data sample consists of public to public restructurings, and requires accounting- and market data going back for a significant period of time. Naturally, this leads to a constrained sample size. We have to bear in mind that we are looking at "survivor" firms that both emerged from Chapter 11 and remained public. It is possible that this in turn may lead to a selection bias in our results because the surviving firms could share characteristics we are unable to control for.

In order to assess the statistical robustness of our results, we use the selected tests outlined in appendix A.2. We check the validity of selected OLS assumptions as well as other potential issues with our regressions, such as multicollinearity. We find heteroskedasticity to be an issue in one of four OLS regressions, and mitigate this issue by using robust standard errors (White (1980)). Further, we assess the goodness of fit for our logit-model using the Hosmer-Lemeshow test. In general, we find both the logit- and OLS-models to be robust and well specified.

Having collected data on a total of six leverage variables, we find it important to separate those that may lead to multicollinearity caused by high correlation. We aim to limit the number of variables in our model to a sensible and relevant level, leading us to choose a single leverage variable we use across all models (see table 7.1 for a correlation matrix of these variables[1]). We choose to use book value due to its higher explanatory power. In short, we find *AdjustedLeverage(BV)* to be the most appropriate variable, as it includes the attractive elements of both *Above Industry Median Before* and *Raw Leverage Before*. Therefore, we see no reason to include more leverage variables. Finally, we have tested a number of alternative specifications, and arrived at the conclusion that equation 5.3 gives the most significant and least biased results. Naturally, with the inclusion of several interaction variables the VIF will be high. However, as pointed

[1]In appendix A.2 a Variance Inflation Factor (VIF)-table for the six leverage variables is included

out by Paul Allison of Statistical Horizons[2], this is neither of concern or interest with regards to multicollinearity. When excluding these interaction variables, we find no evidence or indication of this being an issue. See appendix A.3 for a list of variable definitions.

Table 7.1: Correlation Matrix for Leverage Variables

Correlation	Above Industry Median Before (MV)	Above Industry Median Before (BV)	Adjusted Leverage Before (MV)	Adjusted Leverage Before (BV)	Raw Leverage Before (MV)	Raw Leverage Before (BV)
Above Industry Median Before (MV)	1.0000					
Above Industry Median Before (BV)	0.5049	1.0000				
Adjusted Leverage Before (MV)	0.595	0.4302	1.0000			
Adjusted Leverage Before (BV)	0.424	0.572	0.5447	1.0000		
Raw Leverage Before (MV)	0.4881	0.3986	0.8476	0.4659	1.0000	
Raw Leverage Before (BV)	0.3572	0.5329	0.4229	0.9033	0.531	1.0000

[2]https://statisticalhorizons.com/multicollinearity

Conclusion and Further Research

This thesis analyzes 103 publicly traded firms that recontracted with their creditors under Chapter 11 and remained public during 1990-2013. As our review of related literature uncovered, post-reorganization leverage remains unexplored territory. In particular, recent attempts to explain leverage for firms that emerge is non-existent as far as we can tell. Consequently, we are the first to explicitly analyze debt levels pre- and post Chapter 11 using recent data and an empirical model based on variables of relevance.

Our findings indicate that in line with our first hypothesis, high leverage as measured by the industry median seems to be chronic. That is, firms that are over-leveraged when filing for Chapter 11 will on average emerge with leverage above their peers.

The results uncover that post-reorganization leverage is significantly positively linked to leverage prior to filing. Hence, over-leveraged firms generally emerge with higher leverage than their industry median because they were highly leveraged to begin with (sticky leverage). A possible explanation could be related to firms' low expected cost of financial distress. Surprisingly, our results are contrary to Gilson (1997), who presents results indicating that pre-reorganization leverage ratios do not explain post-reorganization leverage for firms that go through Chapter 11.

We observe that firms reorganizing in the Southern District of New York or Delaware generally end up with less leverage compared to their peers following reorganization. Under the assumption that leverage exceeding the industry median is value destroying, this implies that filing in these districts as compared to other venues is beneficial for post-bankruptcy shareholders. These courts seem to attract filings, possibly as a consequence of their reputation for being debtor-friendly. Management will usually have their incentives aligned with the equity holders, if they believe they will control the firm post-bankruptcy. Since they have the power to choose the venue themselves,

this may be a further explanation for why firms choose to file in debtor-friendly districts. Therefore, it seems logical that ∼69% of voluntary filings take place in New York and Delaware.

Further, our results indicate that changes in firm value are a significant component in explaining leverage when emerging. We see clear and significant evidence indicating that the process of selling assets to pay off debts on average leads to the adverse effect of increased leverage. Creditors pressuring debtors in distress to sell their assets at prices below book value may be the reason for this. Additionally, firms with a low proportion of tangible assets are unable to efficiently liquidate these in order to pay down debts, further supporting our hypothesis. Finally, the data provides evidence that increases in the market value of firms benefits the creditors more than the debtors. This is in line with what we would expect, especially given that Chapter 11 has become an increasingly creditor-oriented process.

Our final hypothesis stating that the BAPCPA-amendments caused firms to emerge more highly leveraged can not be confirmed. We are unable to conclude whether filings made after the implementation of the BAPCPA are significantly different from others since the coefficients are insignificant. A possible explanation is that amendments were to a large extent specifically targeted to affect retail-firms. In our sample there are only six retail-firms, of which only two filed after 2005.

Addressing our research question; *what factors impact capital structure and the probability of being over-leveraged following a Chapter 11 reorganization?*, we conclude that pre-filing capital structure, venue choice, and asset liquidations are all significant explanatory factors. Further, the probability of being over-leveraged when emerging increases by a factor of up to ∼32 if a firm has twice as much leverage as the industry median when filing. Finally, the amendments implemented under the BAPCPA does not seem to significantly impact post-bankruptcy leverage.

In the context of an ongoing debate in Norway regarding bankruptcy protection, these results may prove useful and interesting. In particular, the costs incurred under Chapter 11 may be significantly different from those in a Norwegian liquidation bankruptcy. An interesting topic for future research would be to investigate whether results are similar in other countries with comparable bankruptcy laws to the U.S. There are still unresolved issues in this subject, and we would specifically like to see whether debt conversion occurs even when firms do not have public outstanding bonds, thus expanding this particular sub-sample.

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Appendix A

A.1 Dip-Loan & Converted as Explanatory Variables

Table A.1: OLS-Model

	Industry Adjusted Leverage (T+3) *OLS Model*		**Raw Leverage (T+3)** *OLS Model*	
	BV	**MV**	**BV**	**MV**
	(1)	**(2)**	**(3)**	**(4)**
AdjustedLeverageBefore(BV)	0.538**	0.542	0.334	0.280
	(0.191)	(0.383)	(0.296)	(0.427)
Post2005	0.0288	-0.00856	0.0279	-0.0818
	(0.0822)	(0.152)	(0.117)	(0.136)
Prepack/Preneg	0.125	0.0467	0.141	0.167
	(0.110)	(0.151)	(0.116)	(0.229)
ΔEV	0.0951	-0.630	0.497	-0.354
	(0.368)	(0.609)	(0.470)	(0.581)
ΔBV	0.0848	-0.200	-0.482	1.202
	(0.691)	(1.993)	(1.537)	(1.588)
DE/NY	-0.0165	-0.106	0.0302	-0.0719
	(0.0926)	(0.155)	(0.119)	(0.191)
Assets(BV)	-0.00579	-0.00441	-0.00242	0.0135
	(0.00519)	(0.0136)	(0.0105)	(0.0102)
NonFinance	-0.236	-0.206	-0.109	0.0345
	(0.198)	(0.512)	(0.395)	(0.405)
DE/NY * ΔEV	-0.139	0.505	-0.535	0.183
	(0.381)	(0.642)	(0.495)	(0.611)
DE/NY * ΔBV	0.175	-0.170	0.478	0.0548
	(0.288)	(0.576)	(0.444)	(0.464)
NonFinance * ΔEV	*Omitted*	*Omitted*	*Omitted*	*Omitted*
NonFinance * ΔBV	-0.143	0.598	0.111	-0.998
	(0.559)	(1.775)	(1.369)	(1.332)
DIPloan	0.0489	-0.00248	0.00397	0.00982
	(0.134)	(0.169)	(0.131)	(0.234)
Converted	-0.109	-0.252	-0.157	-0.361
	(0.117)	(0.201)	(0.155)	(0.259)
Constant Term (α)	0.330	0.689	0.436	0.670
	(0.273)	(0.621)	(0.479)	(0.576)
N	31	31	31	31
R^2	0.560	0.492	0.386	0.546

Standard errors in parentheses (Column (1) and (4) use robust estimators)
Significance levels: ***, ** and * indicate 1, 5 and 10 percent.

A.2 Regression Diagnostics

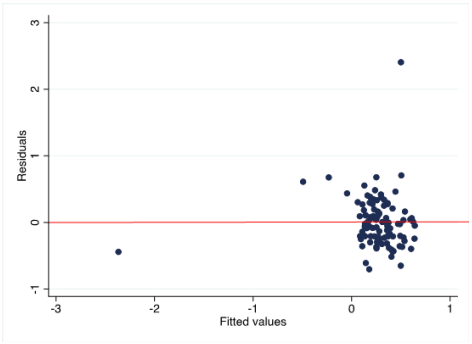
In order to check the reliability of our results, we need to check both the underlying assumptions our models make, as well as our ability to select good, unbiased predictors. In this appendix, assumptions made by the OLS-models are tested, as well as general goodness of fit for both the logit- and OLS-model.

Table A.2: Tests for Primary Specification

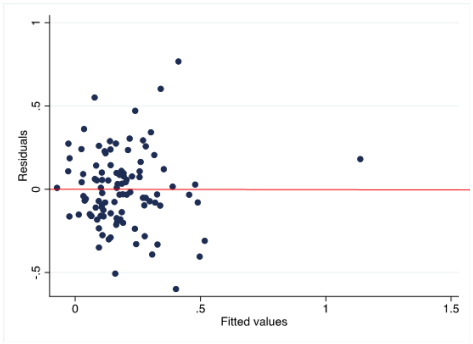
		Logit		**OLS**			
		(1) Above Industry Median (MV)	(2) Above Industry Median (BV)	(3) Adjusted Leverage After (MV)	(4) Adjusted Leverage After (BV)	(5) Raw Leverage After (MV)	(6) Raw Leverage After (BV)
Breusch-Pagan test for heteroskedasticity	X^2			1.07	6.52	4.30	3.11
	$P > X^2$			0.30	0.01	0.04	0.08
Shapiro-Wilk test for normality of residuals	Z			5.77	0.75	4.89	0.09
	$P > Z$			0.00	0.23	0.00	0.47
Ramsey RESET Test	F			2.47	2.33	2.32	1.59
	$P > F$			0.07	0.08	0.08	0.20
Link-test hat square	Z	0.66	0.89	-1.77	0.83	-1.85	0.90
	$P > Z$	0.51	0.374	0.08	0.41	0.07	0.28
Hosmer-Lemeshow Test	$PearsonX^2$	88.62	90.14				
	$P > PearsonX^2$	0.52	0.48				

Our first test, the Breusch-Pagan/Cook-Weisberg test for detecting heteroscedasticity is conducted on all OLS-models. This aims to uncover whether the assumption of constant variance in the error term is met. In addition, we graphically plot the fitted values against the residuals in our models to confirm the test in table A.2. The conclusion based on a 5%-significance level is that models (4) and (5) display evidence of heteroscedasticity. We mitigate the issue by using robust standard errors.

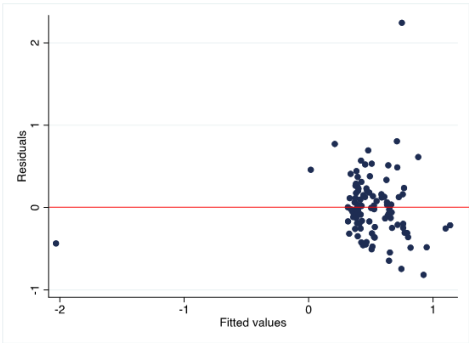
The Shapiro-Wilk test is a test that shows whether a sample is drawn from a normally distributed population, with this being the null hypothesis. We specifically use this test to check whether the residuals in our model are normally distributed. As the table shows, model (3) and (5) display evidence that this may not be the case ($p < 0.05$). Unfortunately, there is no way for us to mitigate this. We decide to disregard this potential issue given that it is not necessarily critical to our analysis.



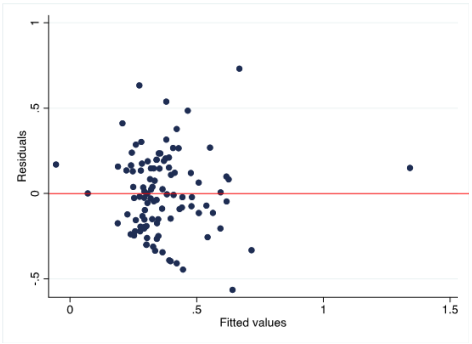
(a) Adjusted Leverage After (MV)



(b) Adjusted Leverage After (BV)



(c) Raw Leverage After (MV)



(d) Raw Leverage After (BV)

Figure A.1: Heteroscedasticity Plots For Each OLS-model

Both the Ramsey RESET test and Link-test show clearly that on the 5%-level, our models do not suffer from omitted variables or misspecification. This issue is consequently not addressed further.

For our logit-model only, the Hosmer-Lemeshow Test checks for the general goodness of fit in a logit-regression. The high p-values lead to the conclusion that our logit-model is generally well specified.

Finally, we check for the potential issue of multicollinearity using the VIF statistic. VIF is generally speaking an explanatory variable's R^2 when regressed on the other explanatory variables. The VIF statistic is calculated as $\frac{1}{1-R^2}$ for each variable. A general rule of thumb states that a VIF statistic above 10 calls for an investigation of the data. However, we argue that since this corresponds to an R^2 of 0.9000, a VIF statistic of 10 is far too high. Other researchers support the idea that anything above 2.5 (corresponding to an R^2 of 0.6000) requires investigation. We choose to rely on the latter. Initially, our results seem to go far beyond these thresholds. However, it is important to note that all multicollinearity is caused by the inclusion of interaction

variables. This would not lead to any issues in this context, and as table A.4 shows the issue is completely mitigated when excluding the interaction variables. Therefore, our conclusion is that multicollinearity is not an issue in our main model.

Table A.3: VIF Including Interaction Terms

Variable	**VIF**	**1/VIF**
NonFinance * ΔEV	354.48	0.00
NonFinance * ΔBV	69.16	0.01
DE/NY * ΔEV	28.82	0.03
DE/NY * ΔBV	5.59	0.18
ΔBV	77.29	0.01
ΔEV	381.39	0.00
Preack/Preneg	1.15	0.87
NonFinance	1.84	0.54
Post2005	1.23	0.81
DE/NY	1.20	0.83
AdjustedLeverageBefore(BV)	1.13	0.89
Assets(BV)	1.07	0.93
Mean	77.03	0.43

Table A.4: VIF Excluding Interaction Terms

Variable	**VIF**	**1/VIF**
ΔBV	1.45	0.69
ΔEV	1.40	0.71
Post2005	1.16	0.86
DE/NY	1.13	0.89
AdjustedLeverageBefore(BV)	1.11	0.90
Assets(BV)	1.07	0.94
Preack/Preneg	1.10	0.91
NonFinance	1.05	0.95
Mean	1.18	0.86

Addressing the potential issue of there being other specifications that offer less biased and more significant results, we have created a total of six alternative specifications. In table A.5 we see four of them, each containing the same variables apart from the leverage-variables being substituted. The final two are shown in table A.7 and A.8. As shown in our thesis, we chose to use *AdjustedLeverageBefore(BV)* due to its attractive features. The table shows that this variable is also the one with the most explanatory power.

Table A.5: Four Alternative Specifications Where Only Leverage Variables are Swapped, all else is equal

	Above Industry Median (T+3) *Logit Model (Odds Ratio)*		**Industry Adjusted Leverage (T+3)** *OLS Model*		**Raw Leverage (T+3)** *OLS Model*	
	BV	**MV**	**BV**	**MV**	**BV**	**MV**
AboveIndustryMedianBefore(MV)	1.027	1.659	0.0765	0.119	0.0471	0.0479
	(0.699)	(1.180)	(0.0735)	(0.117)	(0.0720)	(0.120)
AboveIndustryMedian(BV)	7.684***	2.574	0.176***	0.143	0.124*	-0.0124
	(5.331)	(1.681)	(0.0540)	(0.110)	(0.0671)	(0.113)
AdjustedLeverageBefore(BV)	31.77**	15.09*	0.354***	0.277	0.250**	0.0132
	(48.04)	(21.70)	(0.119)	(0.190)	(0.115)	(0.135)
AdjustedLeverageBefore(MV)	2.631	3.181	0.0967	0.226	0.0188	0.0473
	(2.688)	(3.526)	(0.114)	(0.166)	(0.103)	(0.171)

Standard errors in parentheses
Significance levels: ***, ** and * indicate 1, 5 and 10 percent.

The inclusion of more than one leverage variable can lead to multicollinearity issues. Table A.6 shows the VIF-factor ($\frac{1}{1-R^2}$) between these variables. In addition to causing this issue, there is little to be gained from including e.g. *AdjustedLeverageBefore(BV)* and *RawLeverageBefore(BV)* as explanatory variables since they to a large extent tell the same story.

Table A.6: VIF-Factors Between Leverage Variables

Correlation	Above Industry Median Before (MV)	Above Industry Median Before (BV)	Adjusted Leverage Before (MV)	Adjusted Leverage Before (BV)	Raw Leverage Before (MV)	Raw Leverage Before (BV)
Above Industry Median Before (MV)						
Above Industry Median Before (BV)	2.02					
Adjusted Leverage Before (MV)	2.47	1.76				
Adjusted Leverage Before (BV)	1.74	2.34	2.20			
Raw Leverage Before (MV)	1.95	1.66	6.56	1.87		
Raw Leverage Before (BV)	1.56	2.14	1.73	10.34	2.13	

Finally, specifications testing for possible issues when including both ΔBV and ΔEV at the same time are created in table A.7 and A.8. Comparing these outputs to our main model, and to each other; we see that the sign and magnitude of the coefficients are largely the same when both are included. In addition, the R^2 between them is

0.5194, corresponding to a VIF factor of 2.08 leaving little reason for concern regarding multicollinearity.

Table A.7: Alternative Specification with ΔEV Only

	Above Industry Median (T+3) *Logit Model (Odds Ratio)*		**Industry Adjusted Leverage (T+3)** *OLS Model*		**Raw Leverage (T+3)** *OLS Model*	
	BV	**MV**	**BV**	**MV**	**BV**	**MV**
AdjustedLeverageBefore(BV)	34.62**	15.52*	0.354***	0.289	0.252**	0.0266
	(53.36)	(23.47)	(0.116)	(0.215)	(0.118)	(0.222)
Post2005	2.284	2.092	0.0356	0.0775	0.0113	0.0448
	(1.459)	(1.464)	(0.0531)	(0.113)	(0.0617)	(0.117)
Prepack/Preneg	1.488	0.920	0.0764	0.0124	0.0533	0.0301
	(0.772)	(0.487)	(0.0515)	(0.0992)	(0.0542)	(0.102)
ΔEV	2.305	0.724	0.0475	0.697**	0.212	0.838***
	(4.333)	(1.057)	(0.146)	(0.299)	(0.163)	(0.309)
DE/NY	0.689	0.557	-0.0269	-0.318***	-0.0445	-0.341***
	(0.386)	(0.331)	(0.0570)	(0.107)	(0.0587)	(0.111)
Assets(BV)	0.973	1.079	-0.000509***	0.000247	-0.000545	0.000375
	(0.0385)	(0.0631)	(0.000122)	(0.00101)	(0.000551)	(0.00104)
NonFinance	0.583	8.034*	-0.0868	0.105	-0.215*	-0.233
	(0.936)	(9.805)	(0.0806)	(0.211)	(0.115)	(0.218)
DE/NY * ΔEV	1.975	1.264	-0.0708***	0.0349	-0.0747***	0.0288
	(1.193)	(0.758)	(0.0236)	(0.0432)	(0.0236)	(0.0447)
NonFinance * ΔEV	0.706	2.016	0.0451	-0.706**	-0.122	-0.850***
	(1.339)	(3.007)	(0.148)	(0.300)	(0.164)	(0.310)
Constant Term (α)	2.390	0.335	0.167**	0.337	0.520***	0.956***
	(3.993)	(0.417)	(0.0817)	(0.219)	(0.120)	(0.226)
N	103	103	103	103	103	103
R^2	0.1677	0.1271	0.286	0.195	0.246	0.164

Table A.8: Alternative Specification with ΔBV Only

	Above Industry Median (T+3) *Logit Model (Odds Ratio)*		**Industry Adjusted Leverage (T+3)** *OLS Model*		**Raw Leverage (T+3)** *OLS Model*	
	BV	**MV**	**BV**	**MV**	**BV**	**MV**
AdjustedLeverageBefore(BV)	19.98**	11.16*	0.330***	0.335	0.249**	0.0964
	(27.27)	(15.98)	(0.120)	(0.205)	(0.118)	(0.214)
Post2005	2.034	1.978	0.0393	0.156	0.0289	0.134
	(1.232)	(1.372)	(0.0557)	(0.110)	(0.0631)	(0.114)
Prepack/Preneg	1.211	0.904	0.0865	0.0168	0.0586	0.0301
	(0.596)	(0.475)	(0.0526)	(0.0958)	(0.0551)	(0.1000)
ΔBV	2.533	0.310	-0.214	-1.113***	-0.267	-1.115***
	(4.039)	(0.482)	(0.243)	(0.286)	(0.164)	(0.298)
DE/NY	0.586	0.540	-0.0121	-0.285***	-0.0315	-0.308***
	(0.315)	(0.319)	(0.0619)	(0.105)	(0.0604)	(0.110)
Assets(BV)	0.982	1.088	-0.000497***	0.000211	-0.000545	0.000324
	(0.0356)	(0.0645)	(0.000125)	(0.000974)	(0.000560)	(0.00102)
NonFinance	0.849	10.25**	-0.0374	0.659***	-0.0792	0.385**
	(0.949)	(11.67)	(0.0875)	(0.164)	(0.0944)	(0.171)
DE/NY * ΔBV	1.552	1.354	-0.0679	0.0631	-0.0704	0.0458
	(0.721)	(0.645)	(0.0530)	(0.0769)	(0.0443)	(0.0803)
NonFinance * ΔBV	0.479	3.690	0.321	1.117***	0.374**	1.122***
	(0.771)	(5.815)	(0.249)	(0.288)	(0.166)	(0.301)
Constant Term (α)	1.961	0.274	0.108	-0.274	0.368***	0.275
	(2.342)	(0.330)	(0.0931)	(0.177)	(0.102)	(0.185)
N	103	103	103	103	103	103
R^2	0.1018	0.1035	0.247	0.253	0.224	0.209

Standard errors in parentheses
Significance levels: ***, ** and * indicate 1, 5 and 10 percent.

A.3 Variable Definitions

Variable	Description	Source
AdjustedLeverageBefore(BV)	*Raw Leverage Before (BV) – Industry Median Leverage (BV).*	COMPUSTAT
AdjustedLeverageBefore(MV)	*Raw Leverage Before (MV) – Industry Median Leverage (MV)*	COMPUSTAT
RawLeverageBefore(BV)	$\frac{Long-Term\ Debt(T-5)}{Book\ Value\ of\ Assets(T-5)}$	COMPUSTAT
RawLeverageBefore(MV)	$\frac{Long-Term\ Debt(T-5)}{Enterprise\ Value(T-5)}$	COMPUSTAT
AboveIndustryMedianBefore(BV)	Dummy variable that takes the value 1 if a firms *Raw Leverage Before (BV)* exceeds the corresponding Industry Median Leverage	COMPUSTAT
AboveIndustryMedianBefore(MV)	Dummy variable that takes the value 1 if a firms *Raw Leverage Before (MV)* exceeds the corresponding Industry Median Leverage	COMPUSTAT
Post2005	Dummy variable that takes the value 1 if a firm filed for Chapter 11 after 2005	LoPucki (BRD)
ΔEV	$\frac{Enterprise\ Value(T+3)}{Enterprise\ Value(T-5)} - 1$	COMPUSTAT
ΔBV	$\frac{Asset\ Value(BV)\ (T+3)}{Asset\ Value(BV)\ (T-5)} - 1$	COMPUSTAT
DE/NY	Dummy variable that takes the value 1 if a firm filed for Chapter 11 in the Southern District of New York or Delaware	LoPucki (BRD)
Assets(BV)	Book value of assets at end of FY	COMPUSTAT
NonFinance	Dummy variable that takes the value 1 if a firm that filed for chapter 11 is defined as anything but SIC major group "H: Finance, Insurance, And Real Estate"	LoPucki (BRD)
DE/NY * ΔEV	Interaction variable for the variable DE/NY and ΔEV	LoPucki (BRD)/COMPUSTAT
DE/NY * ΔBV	Interaction variable for the variable Industry; Nonfinance and ΔBV	LoPucki (BRD)
DIPLoan	Dummy variable that takes the value 1 if a firm used Debtor-in-Possession financing during the restructuring period	LoPucki (BRD)/COMPUSTAT
Converted	Dummy variable that takes the value 1 if a firm converted outstanding public bonds to equity during the restructuring period	Thomson Reuters Eikon, validated by plans of reorganization
Prepack/Preneg	Dummy variable that takes the value 1 if the filing is considered a prepackaged or prenegotiated restructuring	LoPucki (BRD)

A.4 Descriptive Statistics

Table A.9: Summary of Variables

	N	μ	σ	**Min**	**Max**
AdjustedLeverageBefore(BV)	103	0.1821	0.2280	-0.2523	1.1362
AdjustedLeverageBefore(MV)	103	0.2537	0.3053	-0.4942	1.6526
RawLeverageBefore(BV)	103	0.3701	0.2325	0.0000	1.3092
RawLeverageBefore(MV)	103	0.4910	0.2882	0.0000	1.6819
AboveIndustryMedianBefore(BV)	103	0.7961	0.4049	0.0000	1.0000
AboveIndustryMedianBefore(MV)	103	0.8155	0.3898	0.0000	1.0000
Post2005	103	0.2718	0.4471	0.0000	1.0000
ΔEV	103	0.3227	2.7460	-1.1557	24.054
ΔBV	103	0.1935	1.2230	-0.9868	6.8430
DE/NY	103	0.6893	0.4650	0.0000	1.0000
Assets(BV)	103	8.320	47.510	0.0127	479.90
NonFinance	103	0.9029	0.2975	0.0000	1.0000
DE/NY * ΔEV	103	0.1825	2.4700	-1.1557	24.054
DE/NY * ΔBV	103	0.0704	0.7677	-0.8739	4.0137
NonFinance * ΔEV	103	0.3676	2.7323	-1.1005	24.054
NonFinance * ΔBV	103	0.2134	1.2072	-0.9868	6.8430
Prepack/Preneg	103	0.3981	0.4919	0.0000	1.0000
DIPLoan	88	0.6818	0.4684	0.0000	1.0000
Converted	31	0.9032	0.3005	0.0000	1.0000

A.5 Leverage by Industry

Figure A.2: Median Industry Leverage Ratio (BV)

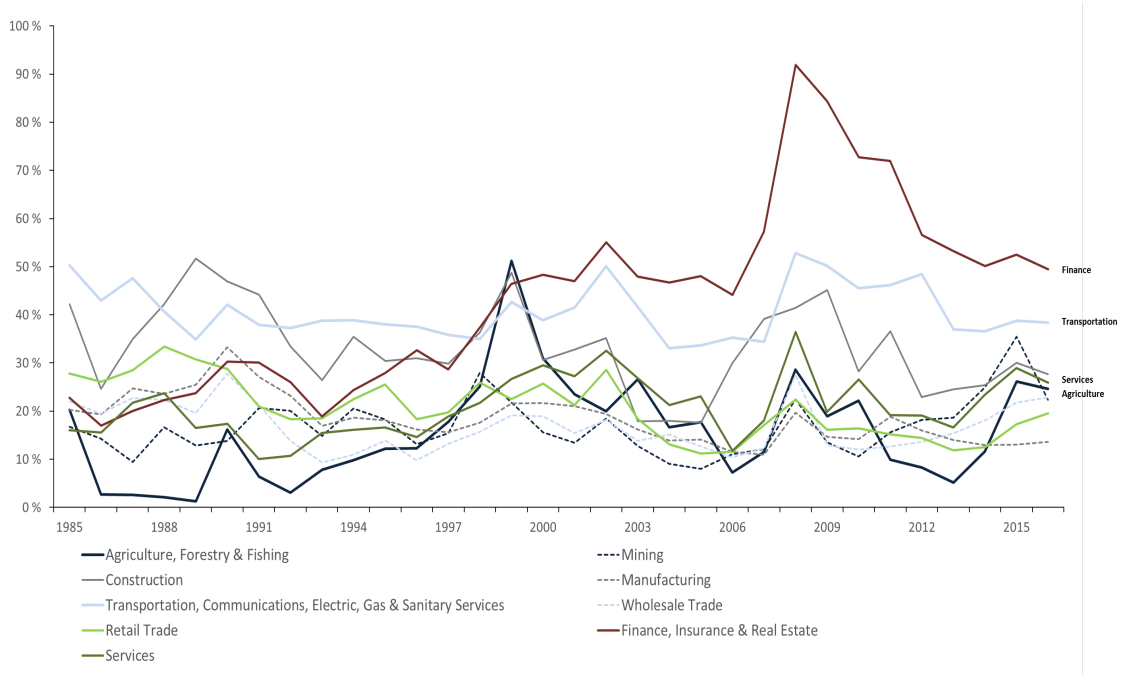


Figure A.3: Median Industry Leverage Ratio (MV)

A.6 Industry Distribution

Table A.10: Number of Firms / Peers in the Data Set

Two-Digit SIC	Industry	N
01-09	Agriculture, Forestry & Fishing	61
10-14	Mining	2179
15-17	Construction	216
20-39	Manufacturing	8359
40-49	Transportation, Communications, Electric, Gas & Sanitary Services	2014
50-51	Wholesale Trade	920
52-59	Retail Trade	1090
60-67	Finance, Insurance & Real Estate	2165
70-89	Services	4703

Note: N denotes the number of firms within each NAICS-group, as extracted from COMPUSTAT

A.7 Industry Overview

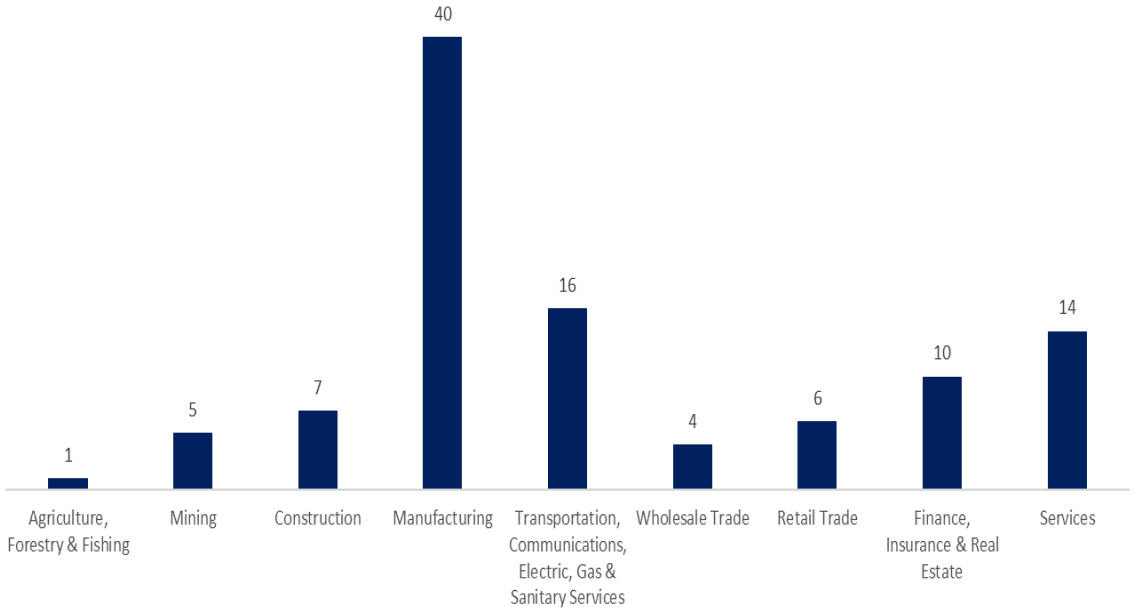


Figure A.4: Number of Observations in Our Sample (N=103)

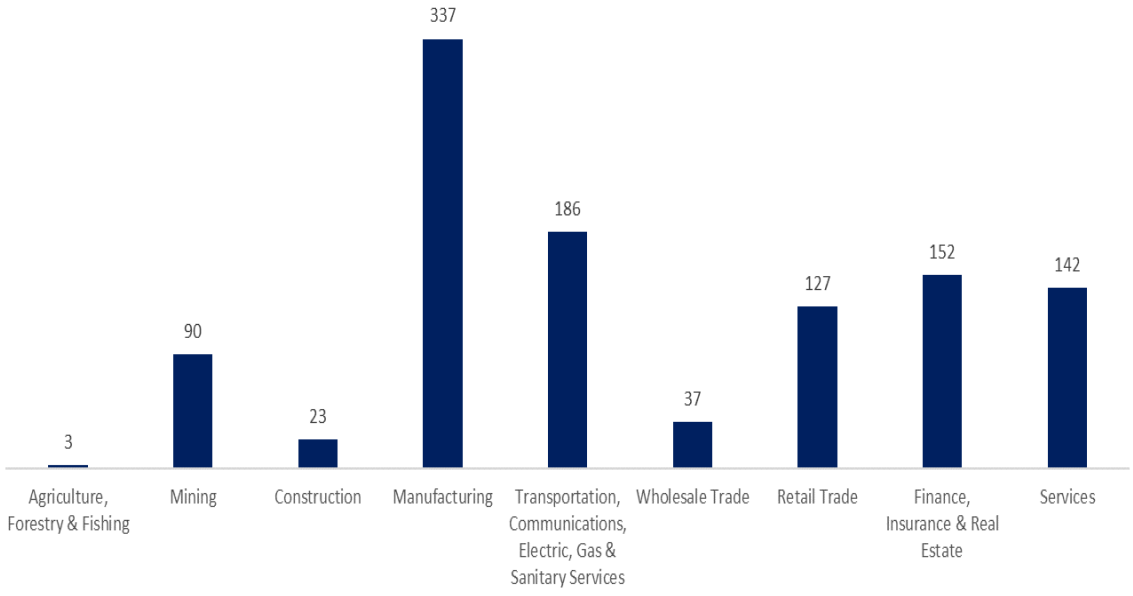


Figure A.5: Number of Observations in Full Sample (N=1,097)

Appendix B

B.1 Absolute Priority Rule (APR)

1. **Secured Claims**
2. **Administrative Expenses**[1]**:** Includes "involuntary gap claims" such as salaries earned after the filing by employees, as well as fees paid to the trustee and professionals it hires
3. **Involuntary Gap Claims:** These are the claims that relate to expenses incurred between the filing and the approval of the filing by a judge. Meaning that they in practice are expenses incurred after insolvency is a fact
4. **Employee Compensation Claims:** Wages and salaries earned within 90 days prior to the bankruptcy
5. **Employee Benefit Plan Claims:** Amounts owed to an employee benefit plan for services performed 180 days prior to bankruptcy filing
6. **Customer Claims:** Mainly for deposits paid by the debtors customers
7. **Tax Claims:** General tax claims; income taxes owed before the filing
8. **Unsecured Claims:** Unsecured trade debt and bond debentures
9. **Equity Claims:** Being last in line, equity holders receive the residual (if any)
   (a) Preferred Stockholder Claims
   (b) Common Stockholder Claims

Note: The Absolute Priority Rule specifies the priority in which a debtor distributes liquidation proceeds based on the stakeholders priority claim, it provides a certain degree of insurance to secured creditors. In addition to the APR, automatic stay provisions are implemented, preventing creditors from collecting debts without approval from the court

[1]Expenses incurred after the filing of the bankruptcy are not considered administrative expenses

B.2 Key Changes Following the BAPCPA

The followng includes key changes in the bankruptcy law, following the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA)

1. **Participation on Creditors' Committees:** Pre-2005, judges were required to form a committee consisting of representatives of the seven largest unsecured creditors classes. The ability to participate on these committees can be valuable because they can hire financial- and legal advisers at the debtors' expense, in addition to getting better access to information and the court. Post-2005, judges are now permitted to change both the size and composition of these committees to ensure better representation of creditors interest

2. **Chapter 22 - Serial Bankruptcy:** BAPCPA takes a strict stand on filing for bankruptcy multiple times. If a firm re-files for Chapter 7 or 11 less than one year after initially emerging from Chapter 11, the automatic stay is lifted in 30 days unless extensions are granted by the court

3. **Prepackaged Chapter 11:** Loosened restrictions on disclosure while creditors votes are being solicited. The intent was to increase the attractiveness of prepackaged filings in Chapter 11

4. **Reclamation Rights:** Vendors can now reclaim products up to 45 days after shipment to a customer, or up to 20 days after the customer files for bankruptcy. For merchandise shipped within the 20 day time-frame, vendors are entitled to convert their prepetition claims into post-petition claims

5. **Treatment of Leases:** Debtors leasing property now only have 120 days from filing, with the possibility of a 90 day extension to decide if they will assume or reject the current lease agreement. This represents a major change. Pre-BAPCPA judges often granted repeated extensions, allowing debtors to defer lease payments which could be several years after the filing

Note: Various critics have expressed concerns that the new provisions implemented under BAPCPA might very well impair distressed firms' ability to reorganize effectively. One reason is that firms have to raise a significant amount of cash at the beginning of a case in order to maintain operations. Many of the new provisions require significant debtor liquidity

B.3 Fire-Sale Mechanics

$$L_0 = \frac{D_0}{D_0 + E_0} = \frac{D_0}{BV_0}$$

$$\Delta BV = BV_1 - BV_0$$

$$\Delta D = \alpha \Delta BV \ where \ 0 < \alpha < 1$$

$$\Delta E = \Delta BV - \alpha \Delta BV \Rightarrow \Delta E = (1 - \alpha)\Delta BV$$

$$\Rightarrow D_1 = D_0 + \alpha \Delta BV$$

$$\Rightarrow E_1 = E_0 + (1 - \alpha \Delta BV)$$

$$\Rightarrow BV_1 = D_0 + \alpha \Delta BV + E_0 + (1 - \alpha \Delta BV) \Leftrightarrow BV_0 + \Delta BV$$

$$\Longrightarrow L_1 = \frac{D_0 + \alpha \Delta BV}{BV_0 + \Delta BV}$$

α denotes the percentage of book value assets are sold for. The final equation relies on the assumption that this amount is used in full to pay off debt. When $0 < \alpha < 1$ and $\Delta BV < 0$ it can be shown that L_1 decreases at a linear rate when α increases. This supports our view that firms in pressured situations that sell assets at discounts, experience the adverse effect of increased leverage.

B.4 Flaws With Common Leverage Ratios

A normal balance equation goes as follows;

$$Assets(AT) = Financial\ Debt(FD) + Non - Financial\ Debt(NFD) + Equity(E)$$

$$\Rightarrow \frac{FD}{AT} = \frac{FD}{FD + NFD + E}$$

In the context of leverage, i.e. proportion of debt to equity, NFD is effectively counted as equity. The following numerical example originally created by Ivo Welch illustrates this:

Table B.1: Numerical Example

	FD	NFD	E	AT	$\frac{FD}{AT}$
Firm A	30	30	40	100	30%
Firm B	30	-	40	70	43%

This would lead to the issue that if Firm B increases its non-financial debt (NFD) it would be counted as equity, and the firms leverage would decrease when it takes on more debt. For our thesis however, this is unlikely to be an issue since the same procedure is applied to all firms in our entire sample, possibly mitigating the bias caused by outliers.